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ALASKA AGRICULTURAL EXPERIMENT STATIONS.**C. C. GEORGESON, Special Agent in Charge.****ANNUAL REPORT****OF****ALASKA AGRICULTURAL
EXPERIMENT STATIONS****FOR****1911.**

**UNDER THE SUPERVISION OF
OFFICE OF EXPERIMENT STATIONS,
U. S. DEPARTMENT OF AGRICULTURE.**

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**ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA,
RAMPART, FAIRBANKS, AND KODIAK.**

[Under the supervision of A. C. TRUE, Director of the Office of Experiment Stations, United States Department of Agriculture.]

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LETTER OF TRANSMITTAL.

SITKA, ALASKA, March 30, 1912.

SIR: I have the honor to submit herewith a report on the work of the Alaska Agricultural Experiment Stations for the year 1911.

Respectfully,

C. C. GEORGESON,

Special Agent in Charge of Alaska Investigations.

Dr. A. C. TRUE,

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Publication recommended.

A. C. TRUE, *Director.*

Publication authorized.

JAMES WILSON, *Secretary of Agriculture.*

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ANNUAL REPORT OF ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1911.

SUMMARY OF WORK FOR THE SEASON.

By C. C. GEORGESON, *Special Agent in Charge.*

THE WEATHER.

Weather conditions must always receive the first consideration in all Alaska agricultural work. Plenty of sunshine during the growing season and a well-distributed rainfall means success, whereas much cloudiness and heavy precipitation means more or less complete failure. The past season was favorable in some respects and in others not. The spring was unusually late and cold. This was true both of the coast region and the interior. It was not until the last of May that the soil was warm enough and dry enough to sow and plant, and not until the beginning of July did the various garden and field crops begin to grow with vigor. At Sitka, July and August were favorable in that there was a moderate amount of sunshine and less than 3 inches of rainfall for each of those months. At this station there were 9 clear days in each month, 19 cloudy days in July and 15 cloudy days in August. But the weather during all of September and the first half of October was exceptional. Usually we have an almost continuous downpour during those two months, with correspondingly cool weather and little or no sunshine, but last year the maximum temperature for September went up to 80° F., while the minimum fell only to 33°, 1° above freezing, while the rainfall for the month was a trifle less than 6 inches, and there were 8 clear days in the month. In October, the maximum temperature reached 63° and the minimum temperature 32°—just to the freezing point. The rainfall was less than 11 inches, but there were nevertheless 11 clear days in the month. This is for Sitka, but the same relative conditions prevailed over the entire Territory, both in the coast region and in the interior.

The result of this was that in the coast region vegetables of all sorts continued to grow much longer than usual, and potatoes and root crops in general were not harvested until the latter part of October. The prolonged growing season increased the yield and improved the quality greatly. This is particularly true of potatoes.

In the interior there was a killing frost on August 31, enough to injure grain that had not matured by that date, but severe freezing weather did not set in until near the end of September in that region, which gave the farmers and gardeners ample time to secure the root crops and to do their fall plowing in good shape. The comparatively dry, mild fall weather was an unusual condition and can not be counted on to occur every year, though it must be noted that in the coast region the fall of 1910 was also comparatively dry and mild and contributed materially to the success of the crops for that year.

WORK AT SITKA STATION.

There has been no change in the plans heretofore outlined. At Sitka, plant breeding, growing, and making comparative tests of the leading vegetables, and nursery work on a small scale are the lines of work which have been and which must be followed. The most important line of plant breeding is the development of hardy strawberries suited to the climatic conditions. This matter has been mentioned with some detail in several of the preceding reports, and is therefore not necessary to dwell long upon it now. By hybridizing cultivated varieties with pollen from the wild native Alaska strawberry of the coast region, more than a hundred varieties have been produced, which yield more and larger berries than either parent and which appear to be entirely hardy and suited to the wet climate of the coast region. The most remarkable feature about these hybrid plants is that they are decidedly more vigorous than either parent. The stems and leaves grow larger and the peduncles are longer and stouter than those of the cultivated plant. The peduncles of the wild berry are weak and procumbent, so that the berries are usually hidden under the leaves or in the grass. The fruit stems of the hybrid berries are, of course, not able to stand up under their load of fruit and are bent down by the weight of the berries which not infrequently rest on a cushion of leaves. The two-parent plants and their offspring are represented in Plate I. The photograph shows admirably the type of each. The plants were taken from the field and grown in boxes during the period that the berries developed. On the left is a typical wild plant showing several small rounded berries. In the center is a normal plant of the cultivated variety, known here as the Hollis, which is the variety from which most of our best hybrids have been produced. It, too, shows a few berries of normal size. On the right is a hybrid plant, which is a good type of the resulting cross. It will be noticed that the leaves are much larger and about twice the height of those on the mother variety. The fruit stems are longer and the berries larger than those of either parent. It may be added

that the quality of the berry is quite equal to that of the wild berry. Many of the hybrids produce berries with a decided aroma, and nearly all are less tart than the berries of the Hollis.

Of the more than 100 plants which have borne large berries, the best 15 have been selected for propagation and special care. They are as yet known only by numbers and will not be named until they have been thoroughly tested, in the course of another year or two. The hybridization work will be continued. There are now being grown about 4,000 young plants which have not fruited, and it may be expected that a few good ones will be found among them. There is no question but that among the hybrids already produced are varieties that will prove to be of great value to Alaska.

On the other hand, it is not expected that these hybrid plants will have any value in the warmer and drier climate of the States. They have been produced in a cool, wet climate, and are therefore in a manner indigenous to it, and the probability is that they would wilt and die if subjected to a hot sun and drought. The station as yet has none of the new varieties for distribution in Alaska or elsewhere.

The wild Alaska strawberry has been tested in California by Mr. Luther Burbank, who states that they failed to produce fruit and were a disappointment to him. It is even a question if they would be of much value in the interior of Alaska where the rainfall is much less than in the coast region. There is a strawberry indigenous to the interior of Alaska which produces a small round berry of high quality. The writer has brought some of these plants to the Sitka Station with a view to using them in the plant-breeding work, but great difficulty has been experienced in keeping them alive. The climate is too wet for them, and until tests have proved the contrary it will not be safe to assume that hybrid plants from the coast region would do any better in the interior than the interior plants are doing on the coast. This question will be settled at our interior stations.

THE SALMONBERRY-RASPBERRY.

A number of hybrid bushes, the result of crossing the Cuthbert raspberry with the pollen of the salmonberry (*Rubus spectabilis*) have been grown. These are now several years old and ought to bear fruit, but they do not. Only three bushes fruited last season, and their fruit was no improvement, either in size or quality, on the mother parent, the raspberry. A number of these bushes bloomed, but failed to set fruit. There seems to be little promise of improving the raspberry by crossing it with the salmonberry.

APPLES.

It gives the writer much satisfaction to be able to report that the young test orchard that was planted in 1903 produced ripe apples for the first time the past season. It is to be noted, however, that

only varieties with crab blood produced fruit. The varieties which fruited were the Yellow Transparent, Raspberry, Sylvan Sweet, Whitney, Hyslop, and *Pyrus baccata*, the last named being a wild species introduced from western Asia. The apples were small to medium in size as compared with the normal size of each variety, but they were of good quality and matured fully. They were not ripe, however, until the middle of October, and it is probable that the favorable weather conditions in the fall, as already noted, are to be credited with the fact that they matured. Had the month of September been wet and cold, as it often is, it seems doubtful whether all of the sorts named would have ripened as well as they did. The trees which showed fruit were 8 years old. In a milder climate they should have shown fruit two or three years earlier. The writer admits that he has been skeptical on the subject of apple growing in Alaska, but the fact that the varieties named have matured encourages further work in that line. Plate II, figures 1 and 2, show the fruiting Raspberry apple trees and one of the Whitney crab trees which bore fruit. Many other varieties are being tested. Among them are Peerless, Martha, Lowell, Tetofsky, Eureka, Brier Sweet, Transcendent, Hibernal, Red June, Iowa Beauty, Early Harvest, Northwestern Greening, Okabena, Yellow Siberian, Patten Greening, Jessie, Duchess of Oldenburgh, North Star, Orange Crab, Jeannette Winter, Alexander, Keswick Codling, Greenwood Crab, and the native Alaskan crab (*Pyrus rivularis*).

In addition, there are in the nursery rows of young grafted trees both of these and of other varieties. Time only can prove their worth.

HYBRIDIZING THE NATIVE CRAB APPLE.

In former reports it has been mentioned that attempts have been made to develop an apple which shall be suited to the climatic conditions of Alaska by fertilizing selected blossoms of the native crab apples with pollen from early maturing hardy varieties obtained from the States. Last year Prof. N. E. Hansen, of the South Dakota Experiment Station, kindly furnished pollen of some of the varieties of apples grown by him. Most of the efforts at crossing proved abortive, the blossoms operated on failing to set fruit. One of the chief reasons for failure is to be found in the fact that the native crabs do not bloom until the latter part of June, whereas the pollen used is gathered in the latter part of April or early May. It therefore has to be kept about two months, besides making a long journey by mail, and, being exposed to changes of temperature, most of the pollen grains shrivel and die, only a small percentage being alive and active when the native blossoms are ready for them. A few seeds were produced, however, last year which have been planted. It will take years to prove the value of the work.

Nearly all the varieties represented in the small test orchard and the nursery made a normal growth the past season and the wood matured better than usual.

CHERRIES.

There are four varieties of the cherry represented in the small test orchard. They are Early Richmond, English Morello, Ostheim, and Dyehouse. These trees are now 8 years old and they have been providing some fruit for 4 years. The conditions are evidently not favorable to them. The Early Richmond, however, seems to be the best of the four named. A single tree of this variety has been trained against the south side of the station building, and it thus receives more protection and more heat and light than free standing trees, with the result that it also fruits better than they. (Plate III shows a section of this tree.) The free-standing trees are normal bloomers, but it is frequently the case that we have cold, rainy weather while they are in bloom, which prevents fertilization, and a large percentage of the blossoms fail to set fruit. The large Heart cherry, also known as the sweet cherry, grown so successfully in the States of Washington and Oregon, is not a success at Sitka. The trees bloom profusely but mature no fruit.

PLUMS.

A number of small plum trees are growing in the test orchard, none of which has shown fruit. Among them are a dozen varieties of Prof. Hansen's hybrids. The trees live on from year to year making growths varying from 4 to 16 inches, but the wood frequently does not mature, and the unripe wood dies back even in mild winters. Up to the present time the outlook for successful plum culture has not been flattering.

FRUIT BUSHES.

All the hardy fruit bushes do remarkably well in southeastern Alaska and the currant and the raspberry also do well all over the interior.

GOOSEBERRIES.

The station has seven varieties of the gooseberry, all of which do well. They are rather more difficult to propagate than the currant and therefore they have not been propagated in great numbers for distribution. Currants grow readily from cuttings planted outdoors in the spring. Not so with the gooseberry. They can be propagated successfully, however, by cuttings made from young wood and set in sand in a propagating house. This is the method finally decided on, though it will require two or three years for the bushes to become

large enough to plant in permanent beds. Another very successful way of propagating the gooseberry is to saw old barrels in two, knocking the heads out, and set the half-barrel cylinder thus produced over the bush, sticking it some inches into the ground if the bush is small. Then fill it with earth, spreading the branches well in the process. In the course of the summer the branches will take root and in the fall or the following spring they can be cut from the mother bush and treated as individual plants. These rooted branches are large enough to plant on fruiting beds at once. The varieties under cultivation are: Smith Imperial, berry medium large, green in color, ripe September 6; Champion, berry medium, green streaked with red, ripe September 8; Red Jacket, berry small red, ripe September 4; Columbus, medium berry, green, ripe September 8; Industry, medium in size, green in color, ripe September 6; Triumph, medium to large, green, ripe September 10; Whitesmith, berry large, green, of excellent quality, ripe September 10.

It will be noticed that all varieties ripen late. The gooseberry does not appear to be attacked by mildew in Alaska, as is often the case in warmer climates. The planting of gooseberries quite generally in the coast region is recommended.

CURRENTS.

The currant is indigenous to Alaska. It grows wild all over the Territory. In the valleys and on the wooded slopes of the Coast Range one will frequently run upon large currant bushes loaded with dark red, luscious fruit. These wild currants are slightly more acid than the cultivated varieties, but they are also more highly flavored and in all respects are equal to the cultivated for culinary purposes. Some of these wild bushes have been transplanted and grown with the cultivated varieties at Sitka Station. It is a remarkable fact that they seem more susceptible to leaf spot than the cultivated sorts, nor do they bear so well under domestication. But the berries ripen two to three weeks earlier than any of the cultivated varieties.

All currant bushes can be readily propagated by cuttings, and the settler who has a few bushes can increase his stock by the following procedure:

In the fall of the year, before cold weather begins, cut off the strongest shoots and make them into cuttings some 10 or 12 inches long. Cut the butt end with a smooth cut just below a bud. Tie them together in bundles, keeping the butts together, then bury them either in a cellar or out of doors so that they can be protected from frost. By spring they will have formed a callous—a tender cell tissue which forms at the butt end from which the roots will

spring. Then plant these cuttings 6 inches apart in rows, putting about half the length in the ground. They will make nice bushes in the course of the summer, when they can be set in their permanent locations. The varieties at the station are: Red Dutch. A prolific variety producing a small berry which is ripe by the middle of August. It is not a vigorous grower. White Dutch. The berries are white, but in other respects it resembles the red variety. Red Cross. A prolific bush which produces small to medium berries, which ripen about August 20. Wilder. The bush is not prolific with us. Berries of medium size. Ripe between August 15 and 20. Ruby Castle. The best variety grown here. It is quite prolific and produces medium to large berries. Ripens between August 15 and 20. Victoria. A moderately prolific variety. Berries medium size. It ripens fruit a little later than any of the preceding. Fay Prolific. Produces large berries, but is not very prolific. Ripe August 20 or later.

There are two species of the black currant indigenous to the coast region of Alaska—*Ribes pauciflorum* and *R. bracteosum*. Both produce large bushes and can be found along streams or in little open glades in the woods. The berries are of excellent quality, less acid than the red currant, and with a peculiar flavor all their own. Many people prefer them for culinary purposes to red currants. Black-currant jelly stirred with boiling water has the reputation of being able to greatly ameliorate or even break up a cold.

Some of the native species have been transplanted to the experiment stations, but they do not do as well under culture as they do in habitats of their own selection. Of the cultivated varieties the station has the Champion, Lee Prolific, and the Common Black. None of them are prolific bearers, though they make prolific growth. The black currant is more subject to fungus diseases than the red currant, and as a protection they are sprayed with Bordeaux mixture. They are easily propagated by cuttings, as described for red currants.

RASPBERRIES.

For purposes of propagation a small patch of each of a few varieties is kept. Raspberries do very well in all parts of Alaska. An indigenous species of the red raspberry is found wild all over the Territory even to far north of the Arctic Circle. In far northern latitudes it is a stunted plant scarcely more than a foot high, while in sheltered mountain valleys it will reach a height of from 4 to 5 feet. This wild species is being domesticated at the Rampart Station. With culture and fertilization it becomes a vigorous grower, but it is a shy bearer, a trait it has in common with nearly all other wild plants brought under domestication. For this reason it is better

to plant the cultivated varieties. Those at present growing at Sitka Station are the following:

Cuthbert. This is, all things considered, the best variety that has ever been tried at the Sitka Station. It is a vigorous grower, fairly productive, and quite hardy. It is not very early, however, which is its only drawback. The fruit is large and well flavored. In 1911 the first berries were ripe August 24 and the last October 14. It will be noted that the fruiting season is long.

Miller. Not quite as thrifty as the Cuthbert and not quite so prolific. The berries also are smaller. The first berries were ripe September 1 and the last October 2.

Turner. A variety which does not differ much from the Miller. Moderately thrifty, berries small to medium in size. The first berries ripe September 4 and the last October 1.

Fuller. This variety was slightly winterkilled. At Sitka it produces small berries and is not at all prolific. The first berries were ripe August 30 and the last October 1.

Champion. Young canes killed back a foot or more by the cold. First berries ripe September 6 and the last ripe October 1. The berries were small.

Superlative. Tips were slightly winterkilled. First fruit ripe September 4 and the last September 28. The berries of this variety are yellow.

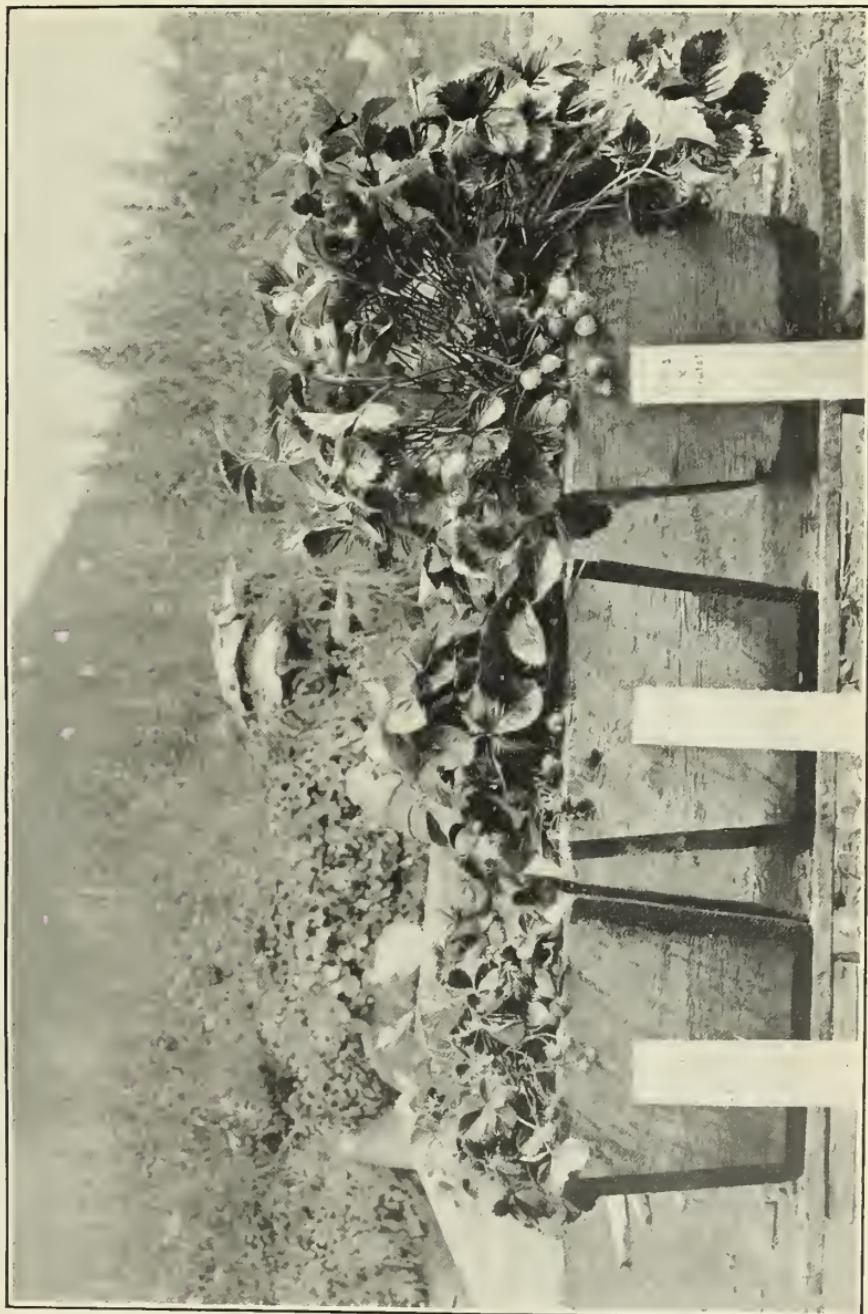
None of the varieties compare with the Cuthbert in size or productiveness for this climate. Raspberries are readily propagated by transplanting the shoots that spring up from the root.

BERRIES WHICH WILL NOT GROW IN ALASKA.

It seems probable that blackberries, dewberries, loganberries, and grapes will not thrive in Alaska. They have been tried, and this statement is here made because of the many inquiries in regard to them. It seems a waste of money, time, and effort to attempt to grow them out of doors anywhere in Alaska. Blackberries, dewberries, and loganberries have lived for some years, eking out a precarious existence, but they never matured any fruit.

VEGETABLES.

In normal seasons all sorts of hardy vegetables do remarkably well all over Alaska, but particularly so in the coast region, where the season is longer than in the interior. The summer of 1911 being unusually favorable, vegetables everywhere produced abundant crops. At the Sitka Station the culture of vegetables has been reduced to a minimum. It is no longer a question of ascertaining if the several kinds of vegetables can be grown. This has been settled beyond



EXPERIMENT IN HYBRIDIZING THE STRAWBERRY.

[From left, Wild Alaskan strawberry, staminate parent; Hollis, a cultivated variety of unknown origin, the pistillate parent, and one of the hybrids.]

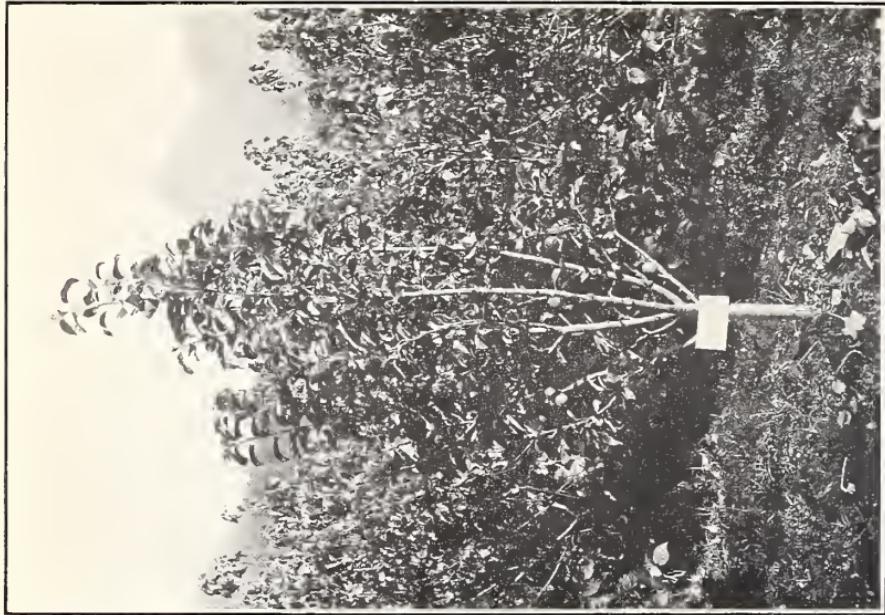


FIG. 2.—EIGHT-YEAR-OLD WHITNEY CRAB APPLE TREE.

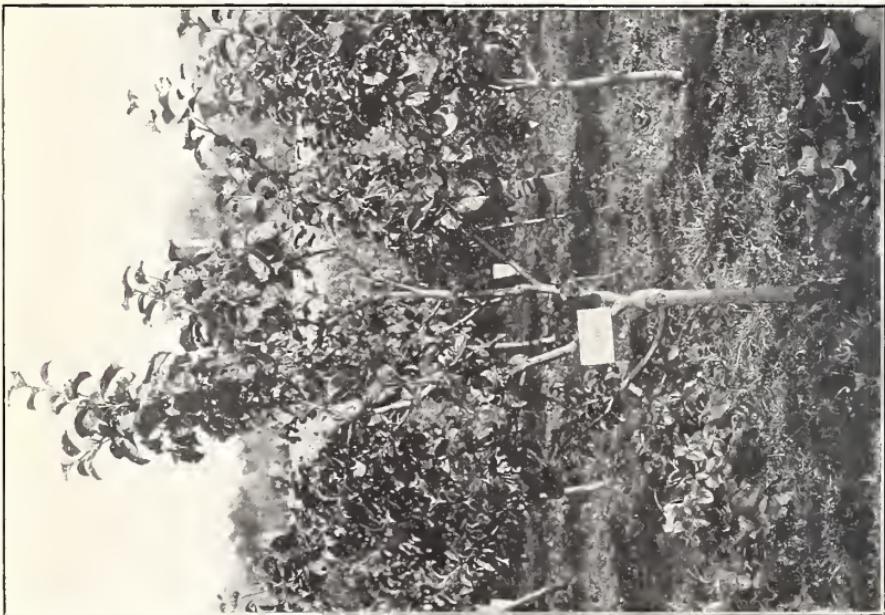
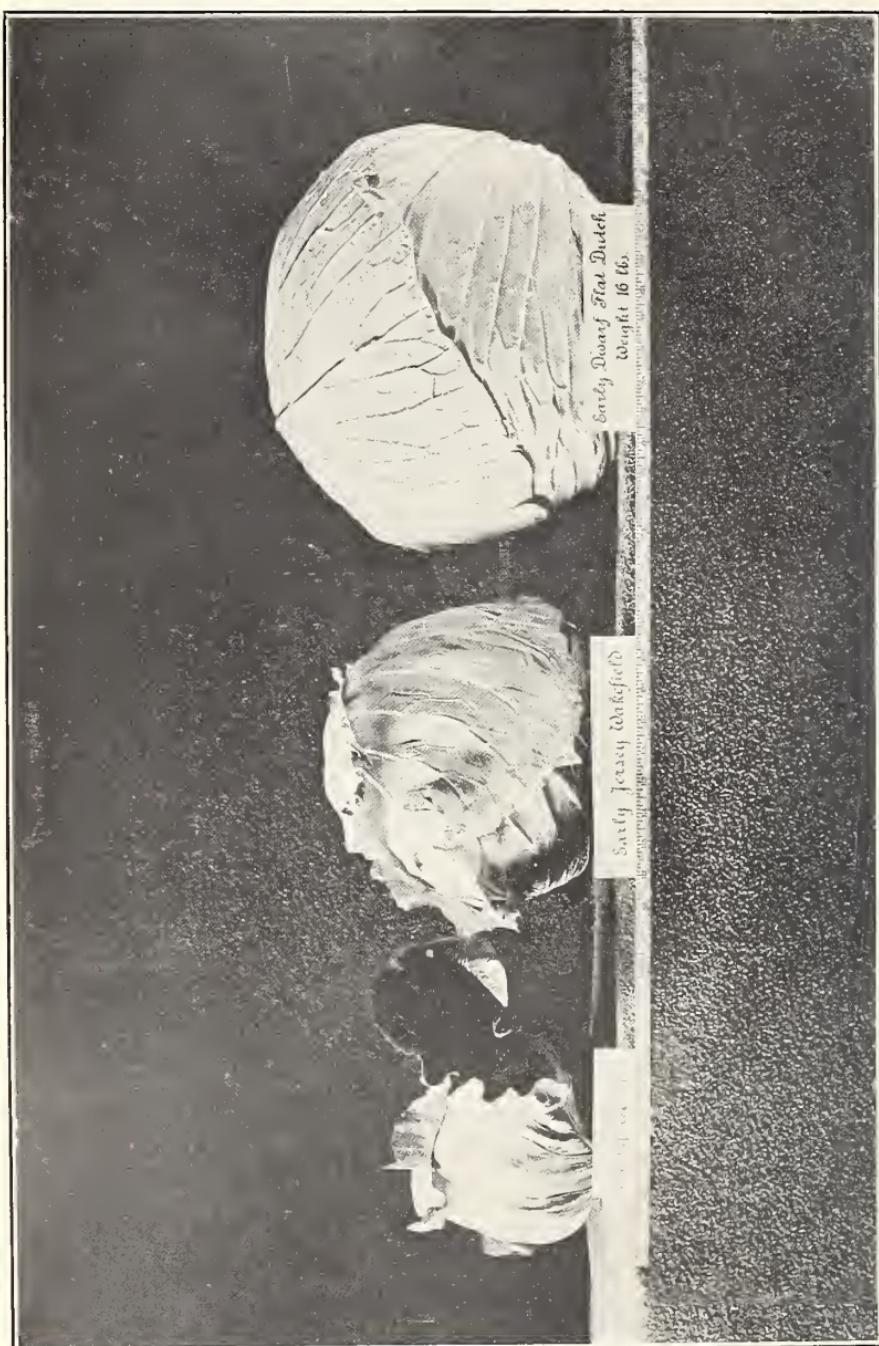


FIG. 1.—EIGHT-YEAR-OLD RASPBERRY APPLE TREE.



PORTION OF EARLY RICHMOND CHERRY TREE, SITKA STATION.



TYPES OF CABBAGE ADAPTED TO ALASKA.

question in past years. It is now a question which varieties of the different kinds of vegetables are best adapted to the climatic conditions. Small patches of a number of varieties of each of the leading vegetables have been grown, and the results of these comparative tests based on a number of years' observation are given in what follows.

POTATOES.

The potato is by long odds the most important vegetable grown in Alaska. It constitutes a very important item in the people's diet. Everybody uses it; everybody knows how to grow it; and with proper care it can be grown all over the Territory. But in spite of this, several thousand tons are imported into Alaska every year. About a thousand tons are shipped into the Fairbanks region alone each summer from the Puget Sound district. It is maintained that "outside" potatoes are drier and mealier than those grown in Alaska, and they therefore bring a higher price in the market than do native-grown potatoes. It is denied that Alaska-grown potatoes are of inferior quality. It is true of some varieties when grown under poor culture in wet soil, but it is not true of all varieties. It is the function of the experiment stations to ascertain which varieties are best adapted to the country, and for this purpose a large number of varieties are grown on a very small scale. These are then compared to each other as to yield and quality, and the inferior ones are rejected, while the best ones are distributed among those who may wish to try them. The reason that some varieties are undesirable is due to the fact that the tubers do not fully mature. The starch grains are not normally developed in immature potatoes, and the tuber becomes soft and "soggy" when cooked. Because of the importance of the subject it is pertinent to repeat here what has already been pointed out in former reports:

(1) Potatoes should be sprouted before they are planted. The best way is to pack them in a solid layer in a shallow box and cover them with an inch of soil, then set the box in a warm room until time to plant; or if one has a cold frame, put them in a layer in this frame, cover them lightly with soil, and protect them with the sash. It is not necessary to ventilate, even on warm days, but it may be necessary to put a canvas cover or other protection over the sash on frosty nights. This should be done about a month before the usual time to plant potatoes. When the time comes to plant take them up carefully so as not to break off the sprouts and plant them so that the tip of the sprout will come about level with the surface of the soil. It will be found that the sprouted potatoes will be three or four weeks ahead of those not sprouted. It thus gives the potato a longer season in which to mature.

(2) Grow only early varieties, which are naturally dry and mealy.

(3) When practicable select a light soil, preferably a gentle slope on the south side of a hill, for the potato crop.

(4) Ridge up the potatoes with a broad double shovel twice during the season; the first time just before they begin to bloom, and the second time immediately after the blooms have dropped. Thus ridged, the soil warms up better. It gives the potatoes the necessary culture, and it protects from the light those tubers which otherwise may be too near the surface, and thus turn green and bitter.

At the Sitka Station new varieties are tested for a season, and in the fall, before navigation closes, a few pounds of each variety are mailed to the interior stations, where they are kept over the winter for further test in that region. Seed potatoes can not be sent into the interior in the spring in time to plant, hence this procedure.

The varieties named below were grown at the Sitka Station the past season. Some of them have been grown here for several years but most of them are new. The acre yield is in most cases very high. It is not to be supposed that if the respective varieties producing 400 bushels or more per acre were grown on a large scale they would yield at the same rate. They were grown in short rows and the acre yield calculated from the number of pounds grown in the area devoted to each kind. Nor is there anything abnormal in the large yields. The soil was rich, the season was favorable, and they received the best of culture.

Variety test of potatoes, 1911.

Name of variety.	Length of row.	Total yield.	Large tubers.	Medium tubers.	Small tubers.	Yield per acre.
	Feet.	Pounds.	Pounds.	Pounds.	Pounds.	Bushels.
Early John.....	22	35	19	10	6	385
Piqua Chief.....	14	40	21	14	5	691
Red River White Ohio.....	12	17	6	4	7	342
Gold Coin.....	30	59	31	16	12	474
Early Hamilton.....	16	35	18	12	3	499
White Beauty.....	16	26	13	9	4	393
Norway No. 2.....	48	56	38	10	8	285
Early Fortune.....	34	36	15	10	11	249
Early Vermont.....	10	23	11	8	4	539
Woods Earliest	28	35	13	9	13	302
Freeman.....	32	73	38	26	9	552
Hamilton Early Rose.....	16	17	7	6	4	254
Bliss Triumph.....	16	8	5	2	1	80
Burbank.....	14	14	8	5	1	242
Early Harvest.....	30	27	10	13	4	217
Peach Blow.....	32	75	32	27	16	567
Irish Cobbler.....	16	44	19	18	7	665
Lincoln.....	8	9	5	2	2	255
Extra Early Ohio.....	26	68	50	8	10	632
Carman No. 1.....	8	8	4	2	2	242
Russian.....	18	27	14	9	4	363
Irish Cobbler (station-grown seed).....	16	48	35	8	5	709
Empire State.....	18	27	9	8	10	363
Lily White	10	(1)				(2)
Early Beauty of Hebron.....	18	23	10	6	7	305
Early Six Weeks.....	40	28	10	8	10	169
Mammoth White.....	8	22	11	6	5	665
Pride of France.....	8	22	15	5	2	665

¹25 per cent not ripe when harvested.

² Small.

Variety test of potatoes, 1911—Continued.

Name of variety.	Length of row.	Total yield.	Large tuthers.	Medium tuthers.	Small tubers.	Yield per acre.
	Feet.	Pounds.	Pounds.	Pounds.	Pounds.	Bushels.
Clarks Alaska Seedling.....	36	89	58	23	8	598
Money Maker.....	38	48	21	20	7	363
Solanum Violet.....	8	17	8	5	4	497
Burpee Superior.....	4	15	8	5	2	907
Extra Express.....	34	76	23	22	31	540
Early Snowball.....	60	17			17	
Extra Early.....	4	7	4	2	1	423
Banner.....	8	11	6	2	3	332
State of Maine.....	8	6	4	1	1	181
Rural New Yorker No. 2.....	8	11	6	3	2	332
McCormick.....	62	78	36	32	10	304
Snowball.....	62	142	49	48	45	572
Mammoth Pearl.....	18	25	10	5	10	319
Garfield.....	18	28	16	6	6	376
Norcross.....	40	69	40	15	14	411
The Thorhurn.....	18	27	12	10	5	363
White Giant.....	92	164	76	60	28	431
Pat's Choice.....	58	87	58	23	6	363
Knowls Big Crop.....	56	112	46	37	29	483
Early Six Weeks.....	120	96	27	23	46	193
Dakota Red.....	120	237	73	108	56	477
Unknown.....	78	108	58	35	20	363
Gold Coin (Gregory).....	56	153	71	57	25	644
Lightning.....	104	211	77	71	63	490
Late Rose.....	94	235	75	82	78	605
Great Divide.....	62	173	62	55	56	675
Fillbasket Extra Early.....	50	87	36	28	23	421
Late Beauty of Hebron.....	42	58	26	15	17	334
Columbus.....	86	179	77	66	36	503
Keeper.....	128	256	126	101	29	484
Junior Pride.....	260	431	195	141	95	429
Early Michigan.....	116	290	154	79	57	605
Irish Cobbler.....	666	659	301	203	155	228
Garfield.....	804	545	353	103	62	164
Early Harvest.....	303	285	150	110	25	228
White Mammoth.....	306	237	133	83	21	187
Norway No. 1.....	738	576	258	183	135	188
Banner.....	612	671	360	154	157	265
Norway No. 2.....	384	363	90	120	153	250
old Coin.....	1,170	2,208	881	850	477	456

CABBAGE.

Next to the potato, cabbage is the most important vegetable in Alaska. It is grown everywhere, and in spite of a large home production great quantities of cabbage are imported to all sections of Alaska. Puget Sound cabbage may be found on sale in every grocery store in the coast region as well as in some of the interior towns where shipments can be delivered before the freeze-up. As in the case of potatoes, varieties of cabbage differ greatly in their adaptation to the climate. Generally speaking, the early varieties are to be preferred because they head with greater certainty than the late ones (Pl. IV). But in favorable seasons the large late varieties will produce a heavier yield per acre than the early sorts. All varieties of cabbage mentioned below received the following treatment:

The seed was sown in flats in the propagating house April 18. The plants were transplanted to the cold frame on May 6 and set in the open ground June 7. In taking the plants from the cold frame, all those that showed signs of clubroot or other disease were rejected. As a consequence, the plants in the field were healthy, nor were they

attacked by root-maggots to any extent. These pests are a serious menace to the culture of cruciferous crops in many parts of the country, particularly in the coast region.¹

Variety tests of cabbage, 1911.

Variety.	Plants set out.	Heads fit for market.	First quality.	Second quality.	Rejected.	Market quality.
Early Jersey Wakefield.....	380	360	304	56	20	Very good.
Early York.....	84	71	52	19	13	Good.
Early Winningstead.....	92	63	48	15	29	Do.
Early Express.....	85	67	54	13	18	Do.
Early Dwarf Flat Dutch.....	205	139	108	31	66	Very good.
Henderson Early Summer.....	101	82	48	34	29	Good.
All Head.....	177	128	92	46	49	Do.
All Season.....	65	37	26	11	28	Do.
Surehead.....	109	72	54	18	37	Do.
Succession.....	99	54	46	8	45	Fair.
Early Drumhead Flat Dutch.....	190	166	64	102	24	Do.
Large Late Flat Dutch.....	65	37	20	17	45	Do.
Danish Ballhead.....	64	32	18	14	32	Good.
Drumhead Savoy.....	96	26	6	20	70	Poor.

CAULIFLOWER.

Cauliflower is a favorite vegetable in Alaska, as elsewhere, and it is planted by market gardeners and by home gardeners all over the Territory, but not to anything like the extent that cabbage is grown. The varieties hereinafter named were seeded, transplanted, and treated in all respects like the cabbage above mentioned. The result places the varieties in the following order:

Variety tests of cauliflower, 1911.

Variety.	Number of plants set.	Production.		
		Large heads.	Small heads.	Did not head.
Gregory Early Snowball.....	260	193	60	7
Extra Early Erfurt.....	94	66	14	14
Extra Early Dwarf Erfurt.....	87	69	7	11
Early London.....	71	27	10	34
Leonard Short Stem.....	80	28	6	46
Large Algiers.....	78	None.	None.	78

PEAS.

Seven varieties were grown side by side, each in a row 80 feet in length. They were all sown at the same time, namely, May 12. The plants appeared above ground May 29, and they were alike in all respects. The varieties may be placed in the following order: (1) Alaska, (2) Advancer, (3) Gradus, (4) Nott Excelsior, (5) Premium Gem, (6) Little Gem, and (7) Washington Wonder. The last four varieties mildewed somewhat and produced only a fair

¹ U. S. Dept. Agr., Bur. Ent. Circ. 63.

crop, while the first three varieties produced a very good crop. Alaska is the earliest pea tested, and all things considered it is the best variety for Alaska, and it is therefore well named. It grows 3½ to 4 feet high and should be supported by brush of that height.

LETTUCE.

Lettuce is also a vegetable universally grown in Alaska. The varieties named below were grown at the Sitka Station. They are named in the order of their value as would appear from last year's test. The seed was sown in flats April 18 and the plants set in open ground June 9. (1) Simpson Extra Curled White Seed, (2) Big Boston, and (3) San Francisco Market (these are particularly fine varieties), (4) Grand Rapids, (5) Large Hanson, (6) Black Seeded Tennis Ball, (7) Early Prizehead, (8) Denver Market, and (9) Salamander.

RADISHES.

A row some 30 feet in length was sown out of doors May 13 of each of the following varieties. All varieties of the radish do well, and while placed in the order given, nevertheless others might arrange the order differently. (1) Wood Early Frame, (2) Early Long Scarlet, (3) Olive Shaped, (4) French Breakfast, (5) Deep Scarlet Turnip, (6) Early Scarlet Turnip, and (7) Early Scarlet Whitetip.

When grown in cold frames or in greenhouses for early use the turnip-rooted or olive-shaped, like French Breakfast, Wood Early Frame, etc., are to be preferred to the long varieties.

Kale, beets, parsnips, parsley, spinach, rutabagas, and turnips were also grown. The fact that these and other similar hardy vegetables can be grown has been reiterated so often in these reports that it seems trite to repeat the story.

ORNAMENTALS.

It is thought important to test and report on some of the hardy ornamental plants. Flowers are much appreciated by Alaskans. A view of the windows, dooryards, and gardens in nearly every settlement in the Territory bears testimony to this fact. Scores of homes in Fairbanks, for instance, are surrounded by tastefully arranged flowers of many varieties, which bloom with a profusion that can scarcely be realized by those who have not seen them. As a matter of fact, flowers are more in evidence about the homes in the interior of Alaska than they are in many of the supposedly more favorable regions of the States. In the first place they are appreciated more in Alaska, and in the second place they are not stunted

by drought and heat as is too often the case in more southerly latitudes.

It is to be noted, however, that in the interior the floral display consists almost entirely of annuals. Few perennial flowers can withstand the winters, but the annuals luxuriate in the climate. The writer has never seen at any place in the world where it has been his fate to travel or sojourn such perfect specimens of stocks, asters, sweet peas, and nasturtiums as seen in the interior of Alaska. Pansies, poppies, California poppies, all in many varieties, are grown with excellent success. This class of flowers do better in the interior than in the coast region, for the reason that they are subjected to more sunshine and a higher summer temperature than on the coast.

On the other hand, the coast region with its mild winters, long growing season, and abundance of moisture is particularly well suited to perennials, and a number of these are being tested at the Sitka Station with a view to learning the kinds that can be recommended for general culture. It is true that with the exception of the aquilegias, which are indigenous to the coast region of Alaska, all of these species have their home in more southerly latitudes and many of them have to be coaxed to do their best, yet with reasonable care a very large number can be grown quite successfully. The list following includes those that bloomed at the Sitka Station in 1911, and they are recommended to lovers of flowers who desire to brighten their homes with a variety of color.

It must be noted, however, that it is necessary to prepare and fertilize the soil if the best results are to be expected. Flowering plants, and particularly those that come from southern latitudes, must have rich soil and good culture. It is also to be noted that with the exception of pansies and aquilegias few, if any of them, will ripen seeds in Alaska, and it is therefore necessary to bear in mind that seeds must be procured and young plants raised to replace those which naturally die in the course of two or three years.

List of hardy perennials which bloomed at Sitka Station in 1911.

<i>Achillea roseum.</i> Milfoil, variety Cerise Queen.	<i>Dianthus caryophyllus.</i> Carnation.
<i>Achillea ptarmica.</i> Flora Plena; The Pearl.	<i>Dianthus barbatus.</i> Sweet william.
<i>Acorus japonicus.</i> Variegated sweet flag.	<i>Delphinium hybridum.</i> English larkspur.
<i>Aquilegia canadensis.</i> Columbine.	<i>Dicentra spectabilis.</i> Bleeding heart.
<i>Anemone pennsylvanica.</i> Pennsylvania windflower.	<i>Digitalis grandiflora.</i> Foxglove.
<i>Astilbe davidii.</i> Spirea.	<i>Geranium sanguineum.</i> Crane's bill.
<i>Baptisia australis.</i> False indigo.	<i>Helianthus,</i> sp. Hardy sunflower, variety Miss Mellish.
<i>Dianthus semperflorens.</i> Variety Her Majesty.	<i>Hemerocallis flava.</i> Yellow day lily.
	<i>Hemerocallis thunbergii.</i> Japanese lemon lily.

List of hardy perennials which bloomed at Sitka Station in 1911—Continued.

<i>Iris siberica.</i> Siberian iris.	<i>Phlox diffusa.</i> Varieties Coquelicot, Mme. P. Langier, Ornament.
<i>Lathyrus latifolius.</i> Everlasting pea.	<i>Phlox suffruticosa.</i> Variety Miss Lingard.
<i>Lilium elegans.</i>	<i>Phlox amœna.</i> Lovely phlox.
<i>Lilium superbum.</i> Turk's cap.	<i>Primula officinalis.</i> Cowslip.
<i>Myosotis palustris semperflorens.</i>	<i>Spiraea aruneus.</i> Goat's beard.
Forget-me-not.	<i>Spiraea venusta.</i> Queen of the prairie.
<i>Papaver orientale.</i> Oriental poppy.	<i>Platycodon leichtlini.</i> Clematis flowered bell flower.
<i>Papaver nudicaule.</i> Iceland poppy.	
<i>Herbaceous peony.</i> Paeonia, varieties Queen Victoria, Festiva Maxima, Officinalis Rubra Flora Plena.	

The several varieties of perennial phlox can be especially recommended as most satisfactory plants for a sheltered nook in the garden. The plants grow 2 to 3 feet high and should be grown in masses. The several varieties of the columbine (*Aquilegia*) are also most desirable plants. They bloom a long time, are perfectly hardy, and mature seeds. The forget-me-not is a beautiful blue-eyed flower which can be grown either in clumps or masses, or can be used as a border for taller plants. The same is true of the primrose (*Primula*). To mention all the varieties that deserve culture would be to repeat the above list. It may be added, however, that carnations can be grown very successfully out of doors. Raise the plants in boxes in the house and plant them out in good soil, where they can have the sun and be in some degree sheltered from the wind, and they will bloom well for two or three years. Young plants are hardy and do not require winter protection except to keep them from heaving out of the ground by repeated freezes and thaws. Mr. G. W. Gasser, superintendent of the Rampart Experiment Station, has grown carnations very successfully out of doors, even in that climate.

Among ornamental shrubs the Japanese rose (*Rosa rugosa*) and the Tartarian honeysuckle in its several varieties are hardy and very ornamental.

WORK AT RAMPART STATION.

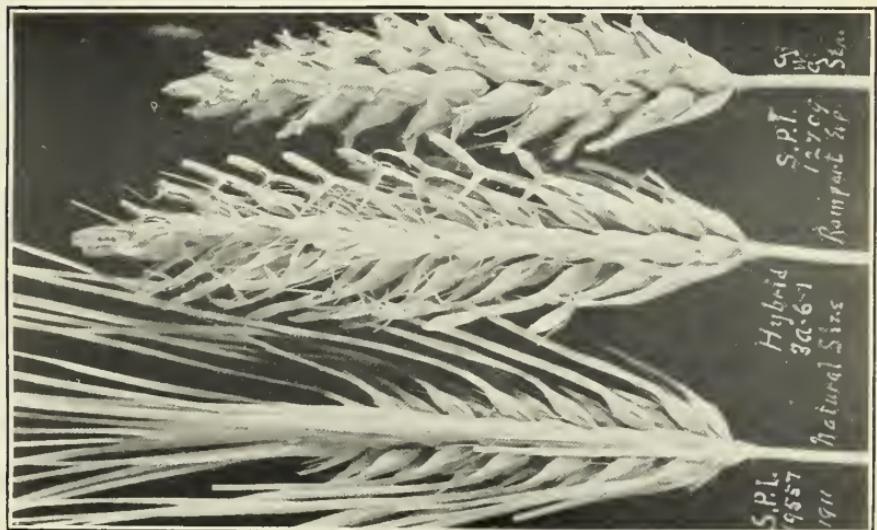
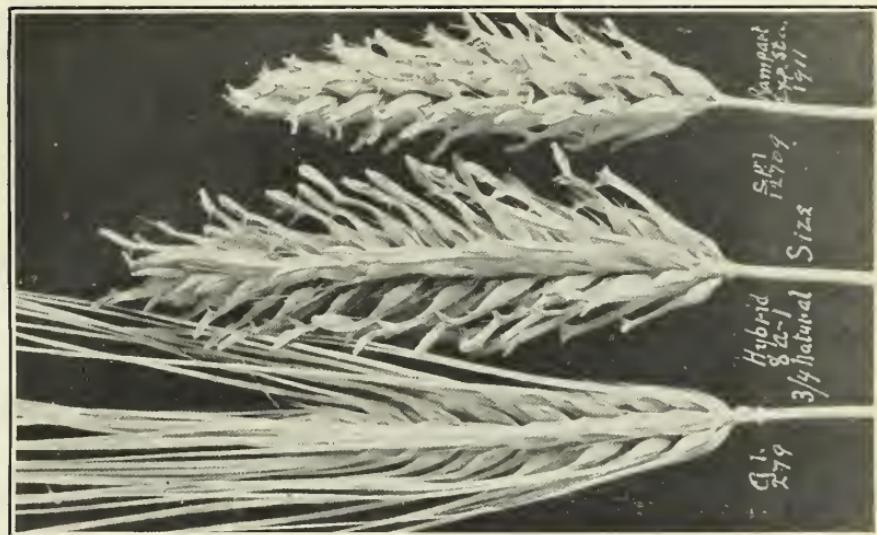
The development of the station has progressed very satisfactorily during the past year. Four acres more have been cleared and there are now 30 acres available for culture during the season of 1912. A much-needed new barn was completed and some necessary implements added to the equipment. With the increased area more work horses were needed, and to meet this demand a horse was transferred from the Fairbanks Station to Rampart, so that there are now three horses at the latter station. There has been no variation in the plans for the work outlined in several preceding reports. Broadly speak-

ing, the lines followed are: (1) The test of varieties of grain, with a view to finding something well adapted to the country; (2) the crossbreeding of varieties which have desirable qualities, in order to develop varieties of greater value than those now known; (3) the introduction, culture, and propagation of hardy legumes; and (4) the growing of vegetables on a limited scale, especially potatoes.

Supt. Gasser has so clearly described the result of these lines of work in his report, which follows, that extended comments are not necessary. Especial attention, however, is called to the result of the work on the improvement of barleys.

CROSSBREEDING OF BARLEYS.

Barley is undoubtedly destined to become the most important cereal grown in Alaska. It is excellent feed for cattle, horses, and hogs. Barley meal is an important article of diet in all northern countries where barley is largely grown. It has a short growing period, and will therefore almost certainly mature everywhere in the interior in normal seasons. Alaska needs a variety which is above all early, which is a heavy yielder, which has a stiff straw, so that it is not readily beaten down by storms, and which is beardless. These are the points which should be embodied in an ideal variety of barley to suit Alaska conditions. Considerable progress has been made toward the attainment of these qualities, as a result of our crosses. In Plate V are shown two hybrids and their parents. In both cases the hybrids are larger than either parent and at the same time they have united in them the desirable qualities of both parents and eliminated the undesirable. In Plate V the hybrid 3a-6-1 is the offspring of the beardless variety, No. 12709, fertilized by a Swedish barley known to us as No. 19557. Seed of both parents was obtained from the United States Department of Agriculture, and both have been grown at the station for a few years. The cross was made in 1910 and the seeds resulting from this cross were sown in May of 1911. The mother parent, the beardless barley, is a desirable variety, except that it is two weeks too late in ripening. The Swedish barley is bearded, and for that reason is undesirable. The hybrid is hooded, the abortive beards forming a compromise between the two parents. While the hoods give it no advantage, they are at least no disadvantage. Beards are a perpetual disadvantage both in handling and particularly in feeding to live stock. It may be seen from Mr. Gasser's report (p. 33) that this hybrid matured in 80 days, which is as early as our earliest barley, Pamir 18922. The hybrid illustrated in Plate V is very similar, the male parent being one of the barleys originally procured by Prof. Hansen and known as No. 279.



HYBRID BARLEYS PRODUCED AT RAMPART STATION.

[Hybrids in center larger and earlier than parents shown at each side.]

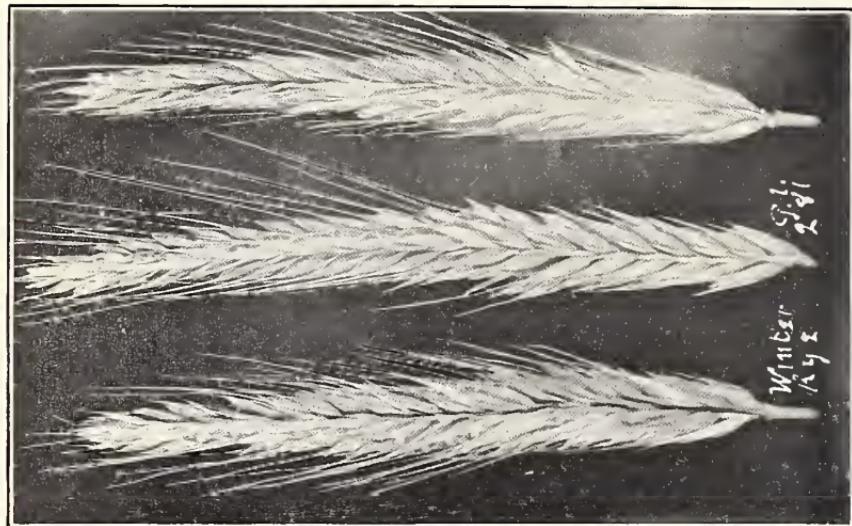


FIG. 2.—WINTER RYE, G. I. 281, MATURED AT
RAMPART STATION IN 1911.

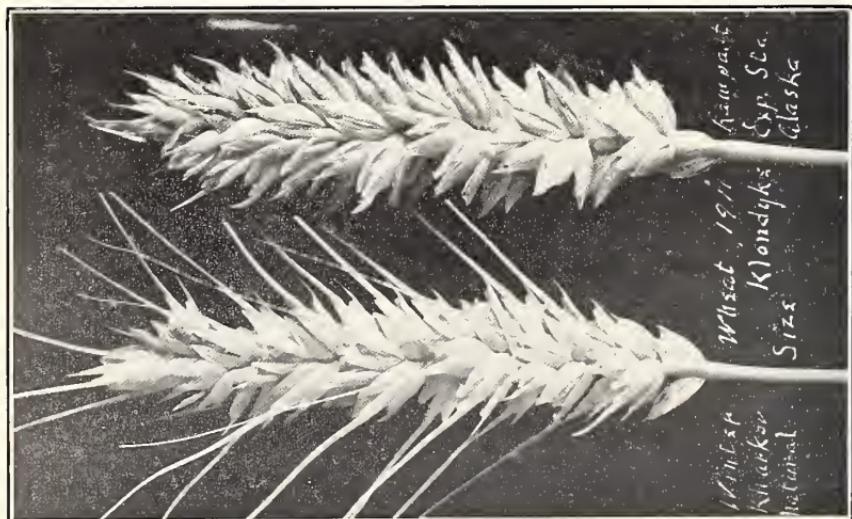


FIG. 1.—KHARKOV AND KLONDYKE WINTER WHEATS,
MATURED AT RAMPART STATION IN 1911.

Crosses were made again in 1911, the results of which will appear when the offspring mature in 1912. There were produced many other hybrid plants in addition to those listed in Mr. Gasser's report which were not deemed of sufficient value to entitle them to be mentioned here.

PEDIGREED GRAINS.

In addition to the hybrids, selections have been made for three years past from the earliest maturing and best individual plants selected from each of a number of the best varieties. The seed from these selections has been sown and studied each year, the best being in turn selected at harvest time and again seeded the year following. These are the grains grown in the plates designated by the capital letter B. By continuing selection it is expected to eventually succeed in fixing the desirable qualities in each variety so treated. It is recognized, however, that this is a long process. The crossbreeding is a short cut to the same results.

There are not so many crosses made each year as there would be if skilled help were available. Up to the present the superintendent has done all the hybridizing himself, and since the grains are in bloom but a few days, the period in which the work can be done is soon over, which limits the output. A skilled assistant, at least during the summer season, is needed to aid in this and other work.

OATS.

The improvement of oats by selection only, and not by crossbreeding, is being attempted, partly because barley is the more important grain, and partly because oats are rather more difficult to work with, and partly, also, for lack of skilled help. The selection will be continued. The old favorite, Finnish Black, still leads the list as the best variety. Several strains of the same sort were obtained from Finland direct two years ago and grown at the station in 1911. When the stock has been increased sufficiently to make a fair comparison possible one or more of these may prove to be better than the Finnish Black that now heads the list. Another variety of black oats known as the Great Mogul (S. P. I. 20464) promises to be a useful variety and even some of our white oats, as for instance Banner and Swedish Select, acquit themselves well in favorable seasons.

WINTER GRAIN.

There is nothing new to report in the winter grain situation. Small plats of winter wheat and winter rye (Pl. VI) are seeded every year, and every year a large percentage is winterkilled. Kharakov winter wheat, a lightly bearded variety imported from Russia by

the United States Department of Agriculture, has so far proved the hardiest wheat tried, but it winterkills unless it is protected with at least 30 inches of snow. The Klondyke, a variety obtained from a seed house in Canada, has a smooth head and looks promising, but it, too, winterkills badly. Winter rye is hardier than wheat. While it always suffers some from winterkilling, a larger percentage of the crop survives when grown under similar conditions.

POTATO CULTURE.

The potato experiments have been emphasized in former reports from this station. These experiments were continued during 1911. New varieties are tested until their real merit can be determined, then the best ones are retained and the poorer sorts discarded. Mr. Gasser's report gives a list of new varieties sent to Rampart from Sitka Station in the fall of 1910 and grown at Rampart for the first time in 1911. The data are of value chiefly in that they describe the character of the tubers. The fact that the yield was small this past year does not necessarily condemn the light yielders. In order to get them in by mail before navigation closed the seed from which these results are obtained had to be dug before the potatoes were full grown. Another year will prove their real comparative value.

The variety known as Irish Cobbler is perhaps, all things considered, the most valuable sort for the interior. The tubers are of medium size and fairly uniform, of an irregular rounded shape. The eyes are deep, which is a drawback, but the skin is thick and tough, which is a decided advantage, in that it is not readily skinned in the process of handling and can therefore be marketed in an attractive condition. It is, moreover, a good yielder and of good quality.

A fertilizer test with potatoes was carried out at the Rampart Station the past year which proved that nitrogen was the most effective fertilizer. It was applied in the form of sodium nitrate, both alone and in combination with superphosphate and muriate of potash; but in nearly every case where the nitrogen was applied the soil responded with a greater crop than it did where the nitrogen was omitted, though the others were applied.

OTHER VEGETABLES.

Cabbage, cauliflower, peas, lettuce, radishes, and other vegetables were grown on a small scale only and with much success. The superintendent reports that Swiss chard grew well and was a particularly desirable vegetable. It is a variety of the beet in which the

leaf stalks have been largely developed, and they are used in several ways. It is one of the vegetables, now practically unknown to Alaska, to which it will be well to give some attention hereafter.

A point of interest is the fact that Mr. Gasser matures his own garden peas from year to year, and that he finds them as good yielders and as vigorous growers as seed obtained from the outside. He has also grown turnip seed on a small scale successfully. It will be a decided step in advance when Alaska shall produce the seed grain she needs and also seed of the more common and hardy vegetables.

EXPERIMENTS WITH LEGUMES.

Next to the grain breeding, the most important work assigned to the Rampart Station is the testing and acclimating of hardy species of legumes. This work has only just begun and as yet there are no notable results to report, but the outlook is promising. All the varieties of Siberian alfalfas introduced by Prof. Hansen and offered for sale by the South Dakota Experiment Station have been procured and are growing. When the writer visited the Rampart Station last year there were several small patches of seedlings of these alfalfas and plants a year old which had survived the winter without any apparent inconvenience. Some of these latter bloomed, but produced no seed. A hardy legume will be comparatively useless unless it can be perpetuated where it is grown. The seedlings will be planted out far enough apart so each plant can be studied individually in the hope of finding that some of them will produce and mature seed. If one or more of these alfalfas should become established in Alaska, the problem both of feed for cattle and of the maintenance of the fertility of the soil will be solved. It will take some years to definitely settle the question.

Hitherto there has been little seed obtainable. The mode of procedure for propagating these alfalfas was therefore as follows: Plants were purchased from the South Dakota Experiment Station and sent to the Sitka Station, where most of them arrived alive but in an exhausted condition. They would have been dead beyond resurrection if their journey had been continued another month to the Rampart Station. When established at Sitka they were propagated by cuttings, which can be done by starting the soft shoots in a bed of sand in the greenhouse. They would root in the course of the summer, and the next spring these rooted cuttings can be mailed to their destination in the interior, where they again must receive special care for a time until they become established. This work will be continued.

WORK AT FAIRBANKS STATION.

Satisfactory progress has been made at this station during the year. The building operations are now practically completed. Some 23 acres of land were cleared, which does not include the native meadow-land from which hay can be gathered. Considerable fencing was done and the buildings were painted. A much-needed potato cellar was built by tunneling into the hill. It is 61 feet long, 15 feet wide, and 8 feet high, and provision has been made so it can be warmed artificially if needed in extreme cold weather. Henceforth the expenses at this station which do not directly bear on production will be for the clearing of land.

It has been stated repeatedly in former reports that the plan for work at this station—at least for some years to come—would be to ascertain if farming can be made profitable in the interior of Alaska when considered as a business by itself. To this end it is necessary to operate on a fairly large scale, and the important point is to get a sufficiently large area of good land cleared and put under culture. This is expensive work. The standard wage for day labor is \$7.50 per day. The best land is that which is most heavily timbered, and therefore the most expensive to clear.

GRAIN CROPS.

The small-plat experiments at Fairbanks have been discontinued in order that there might be more time to devote to the regular business of farming. Most of the land under plow this year was seeded to oats and barley, but over a large portion of this area the yield was very light, owing to the lack of fertility in the soil. It is becoming more and more apparent that it is necessary to fertilize liberally if one expects an abundant harvest, but fertilizers are scarce, and the time-worn method of summer fallowing and cropping the land only every other year has been followed. By this means fairly good crops of grain can be obtained. To use artificial fertilizers is too expensive. Stable manure can not be had in sufficient quantity, and the legumes, which are used elsewhere as a means of restoring fertility, are lacking. This explains the anxiety that has been repeatedly expressed for the success of the Siberian alfalfas in Alaska, which have but recently been introduced at the Rampart Station. Even with these drawbacks a fair crop of oats was raised at Fairbanks. In order to harvest the crops a self-binder was sent to the Fairbanks Station, the first machine of the kind that was ever brought into the Territory of Alaska.

THE HAY QUESTION.

Until the settler gets enough land cleared on which to raise his own grain, and especially the hay needed for his work animals, he finds himself constantly handicapped. So few farmers have as yet reached

that point that there is a good market for hay, the prices varying, however, with the locality. Imported timothy hay sells for about \$100 per ton, while native hay from wild grasses is worth about \$50 per ton, and grain hay fluctuates between these figures according to the demand of the market. It is evident that when hay is worth such prices it is expensive to winter a team, especially if that team is wanted only for comparatively short periods during the spring and summer. The cost of feed has been considered and it was found cheaper to hire extra teams at the standard price of \$12.50 per day for a couple of weeks during early spring when work must be rushed than it is to keep a lot of horses the year around in order that they may be available when needed. It so happens at Fairbanks that a lot of stage horses become idle when the spring thaw breaks up the trail, and therefore it is possible to get the work done when needed, with only one permanent team. It was concluded that there would be more money in selling the hay than in feeding it to horses which were perfectly idle for more than three-fourths of the year. The number of work horses at the Fairbanks Station has been reduced to one good team at the present time, and what surplus hay is produced will be sold.

THE POTATO CROP.

Potatoes are at the present time looked upon as the farmers' money crop. There were 7 acres in potatoes last year at the Fairbanks Station, which produced about 25 tons of marketable potatoes and several tons of culls. The crop has not been sold at this writing, but it is estimated that it will bring about \$2,500. Potato prices have gone down rapidly at Fairbanks in the last four years. In 1907 native-grown potatoes retailed at 20 cents per pound, or \$400 per ton. Such prices led to the planting of considerable areas without proper selection of either soil or seed, and in most cases without proper culture. The result was that a large amount of inferior potatoes were thrown on the market. They not only pulled down the price, but they acquired a bad name for the native-grown potato, and this effect is still felt. The consumer discriminates against them, and therefore importers find it profitable to ship in potatoes from Seattle in great quantities. One of the best informed dealers in Fairbanks told the writer there were at least 1,000 tons of "outside" potatoes shipped into the Fairbanks country each year. Doubtless this will continue until the growers learn to grow potatoes properly. The writer calls their attention to Mr. Neal's directions to that end in his report herewith.

CABBAGE AND CAULIFLOWER.

Vegetables are grown on a very limited scale at Fairbanks Station, and the selection is almost limited to cabbage and cauliflower.

FUTURE WORK.

The needs of the station are now practically limited to an increase in the area under cultivation, that is to say, the area of good land. The station buildings stand near the base of a low wooded ridge. The timber is mostly birch, interspersed with some scattering spruce and cottonwood. The south face of the ridge is the best land and future clearing will chiefly be done here. Although the expense will be greater than to clear the comparatively barren north slope of the same ridge, still, considering the difference in productive capacity of the soils in these two situations, it will be economy to clear the heavier timbered area. For some years to come it will be the policy to grow those crops for which a home market can be found, and to practice those methods of culture which shall, without exhausting the soil, give the best returns from the standpoint of the practical farmer.

WORK AT KODIAK STATION.

The cattle and sheep at the Kodiak Station have done well the past year and development work has also progressed favorably. A new 100-ton silo was erected at the dairy barn at Kodiak, and additional fencing has been done both on the reservation at Kodiak and on the reservation at Kalsin, or as formerly called Calsinsky, Bay (Pl. VII). Some necessary additions have also been made to the haying equipment and a large skiff has been built, with a carrying capacity of about 15 tons, needed to carry live stock to and from Kodiak and Kalsin Bay. An addition to the barn at Kalsin Bay was made, 20 by 60 feet, and additional land was cleared of brush and driftwood at this place so that the mower can be used on it.

THE HERD.

If further proof were needed that the Galloway is adapted to the coast region of Alaska, it has been furnished during the past year. The cattle have done exceedingly well on native pasture and hay and silage made from native grasses. The stock is healthy and thrifty. There is no question but that the Galloway is the breed for the country. There were 28 pure-bred calves dropped during the year, 14 of which were heifers, and the losses from death and accident were only 2 animals, a bull calf lost by drowning and the 6-year-old service bull, Extirpator, which died of pneumonia. Some sales have been made; 2 bulls have been sold for breeding and 2 bulls and 3 steers have been sold for beef. At the present writing the herd numbers 85 head, of both sexes and all ages. Mr. Snodgrass gives a detailed description in his report of the handling and feeding of the herd, so it is not necessary to go into it here.

It is becoming apparent that the market for such breeding animals as we have to offer is very limited. A number of Galloway bulls have been sold to settlers during the last three or four years, so that the demand from that source is pretty well supplied, and as yet we have not offered females for sale. There is a decided demand for milch cows, a demand which we have not been able to supply up to the present time, because it is the policy to keep the good milkers in the herd with a view to using them for breeding, and thus gradually develop the milking quality; and until we have milkers to spare the sale for breeding purposes will be limited. All inferior young animals and old cows and bulls will be slaughtered for beef, for which there is a market at the towns of Seward, Valdez, and Cordova.

The plan is to keep the herd up to the highest point of excellence as to the merit of individual animals which it is possible to develop under prevailing conditions. The Galloway is naturally a small animal, and the size is not increased when young stock is reared on native grass and hay. In a grain-growing country the size could be increased, but in Alaska the cost of grain feed is too high, since it all must be imported from the Puget Sound country. When the station is thoroughly established, some 30 or 40 acres of land will be cleared on which to grow grain feed, particularly beardless barley. This will be an advantage to the herd and an economy in its maintenance. As it is, about 10 tons of grain and mill feed are purchased a year, at an average cost of \$50 a ton laid down at Kodiak. This grain is used only for young animals, and occasionally for the whole herd in the late spring before grass comes, which is always the most critical period in the year.

THE PROPOSED DAIRY.

No actual dairy work has been done at Kodiak up to the present time. It is now planned to begin the manufacture of butter and cheese on a small scale in the summer of 1912. This part of the work will be done at Kodiak, where a dairy barn has been built and a small building has been erected in which to care for the milk and its products. The plan is to pick up from the Galloway herds in the States some of the best milkers that can be found, for there are occasionally good milkers among the Galloways, bring these to Kodiak, and, together with the few fairly good milkers now in the herd, make them the foundation for a pure-bred Galloway dairy herd. It is recognized that better milkers could be obtained from other breeds and from grade animals, and that these cattle would undoubtedly do well when handled as dairy cattle should be handled. But that is not the point. It is not a question of producing a large quantity of milk and manufacturing butter and cheese with a view

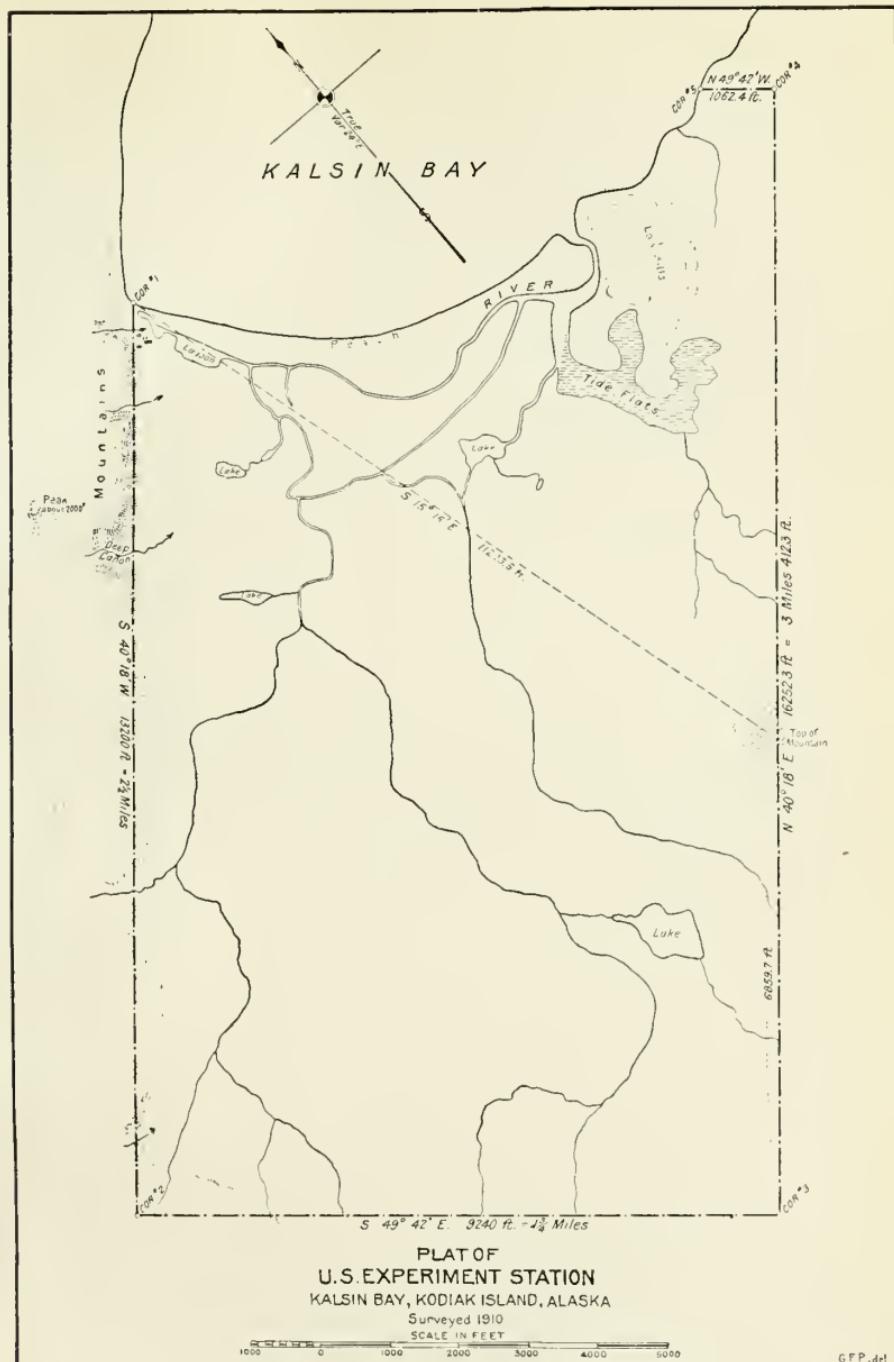
to making the enterprise profitable. The point of the experiment is to develop the milking quality in the Galloway so that settlers can eventually be supplied at reasonable prices with cows that meet their need for milk and at the same time retain the hardiness, the rustling qualities, and the feeding qualities of the Galloway. There is no question but that this can be done, and it will be done if our plans are adhered to in the future. The writer believes that this will be a work of signal value to Alaska in years to come. Had the money been available, this work could have been begun several years ago. Development work must be gradual at all our Alaska stations, and gradual development has the advantage that serious errors can thereby be avoided.

THE SHEEP.

That sheep breeding can be made a success in the coast region of Alaska has been proved by the last year's experience with the station flock. Forty ewes were purchased in the spring of 1910. Five of these were lost during the year, but the remainder have done exceedingly well. It is a question of starting with the right kind of sheep. Pure-bred Merino or Merino grades of the kind that are used so extensively in the forest pastures of Idaho and Montana are unsuited to the country. In fact no short-wooled sheep are desirable. It is a wet climate. A short, thick wool holds the moisture and loads down the animal with a weight to such an extent that a sheep not in prime condition is not able to rise once having lain down. The sheep for the country are the large, long-wooled breeds. The wool sheds the rain. The animals, too, are stronger and constitutionally better adapted to a wet climate. This is the class of sheep at the station. None of the ewes are pure bred, but they are fine Cotswold and Lincoln grades, and they are mated to pure-bred Lincoln and Cotswold rams. These rams were selected from show stock exhibited at the Washington State fair, and are fine specimens of their respective breeds. Each weighs 300 pounds and will shear 25 pounds of wool apiece. The ewes averaged 7 pounds of wool a head when sheared in June, 1911. During the past year 37 lambs were dropped, of which 31 were saved. All of these had been sired by the Lincoln ram. Mr. Snodgrass details the treatment of the flock in his report (see p. 63).

NEEDS OF KODIAK STATION.

The station is far from being fully equipped. One of the pressing needs is a new launch to replace the old one. The station has a splendid engine, but the launch is too small and too old to trust when the sea is at all rough. A larger and safer hull is needed, and such a hull will cost from \$800 to \$1,000. Such a launch is an



PLAT OF EXPERIMENT STATION AT KALSKIN BAY, KODIAK ISLAND.

absolute necessity. Kalsin Bay, where the main herd is located, is 15 miles from Kodiak, the shipping point and headquarters, and the dairy above mentioned will be located there. Cattle, work horses, and supplies have constantly to be carried back and forth between the two places, and the trip necessitates the crossing of an open arm of the ocean, which much of the time is too rough for even a good launch. The hull of the old launch is only 22 feet long. A launch 36 or 40 feet long is needed, which can be operated easily by the 12-horsepower standard engine now in the old launch.

A dwelling is needed for the superintendent. It should be located near the dairy barn. At present he is in a rented house in town, a quarter of a mile from the barn. A cottage is also needed for a dairymen, who will also serve as herdsman for the dairy cows. An ensilage cutter is needed and a gasoline engine to run it; also a scale on which to weigh live stock. These are the more pressing needs which must be met as soon as possible.

REPORT OF WORK AT RAMPART STATION.

By G. W. GASSER, *Superintendent.*

CLIMATIC CONDITIONS.

A fair understanding of the weather from May to August may be had from the appended table. There was a little more sunshine than usual and quite a bit less rain. The average temperature was 1.4° above normal. The number of days between frosts was 89; the last frost in the spring came June 2 and did practically no harm. The first frost in the fall came August 31. July, therefore, was the only month during which there was no frost. It is worthy of note that at two points, 3 miles and 12 miles, respectively, below the experiment station, potato vines were not frosted for two weeks after potato tops had been frozen to the ground in the experiment station field. Mild weather accompanied with cloudy, rainy days, prevailed throughout September and into the middle of October. Ice did not begin running in the river until October 25, nearly three weeks later than usual.

Summary of weather, May to August, 1911.

Month.	Clear.	Partly cloudy.	Cloudy.	Minimum temperature.	Maximum temperature.	Mean temperature.	Precipitation.
May.....	Days. 12	Days. 6	Days. 13	°F. 23	°F. 68	°F. 46.6	Inches. 0.48
June.....	9	13	8	27	91	59.4	.34
July.....	7	15	9	38	89	63.8	.43
August.....	9	11	11	25	85	56.3	1.12
Total.....	37	45	41	.....	.....	56.5	2.37
6-year average.....	36.3	39.1	47.5	.....	.....	55.1	4.44

WORK OF THE SEASON.

Despite the heavy snowfall (53 inches) the field dried off early and spring work began a couple of days earlier than the preceding two years. The plowed field was so dry in places in the fall (1910) that the coarser soil particles did not freeze together, so that any time during the winter the ground, as deep as plowed, could be readily shoveled about. Doubtless this dry winter condition helped to secure an early seed bed. The harrow was started May 10 on some knolls. The first seeding was done on May 16, a light rain intervening. From then on, with the aid of two men, the spring planting was pushed rapidly along. A couple of light showers the latter part of the month put the ground in good shape to start the grain. By the 1st of June seeding was finished, with the exception of the new land and some grass plats. This new land was seeded with a mixture of barley and oats for hay, and made a good crop.

The season which opened so favorably turned out very dry during June, July, and on to the middle of August. By that time nearly all the grains were ripe, but the potatoes and the garden were greatly benefited by the late rains. As noted later, all crops did well. Some of the grain yields exceeded anything heretofore produced.

Along with the regular farm work about 2 acres more land were cleared, making the total under cultivation about 28 acres. Adjoining the house on the southwest side a greenhouse, 14 by 16 feet, is well underway, the work necessary to complete it being of such a nature as to permit of its being done this winter. A knockdown, 20-foot boat and a 6-horsepower engine were received this summer. The boat will be set up this winter. A disk harrow and a seed drill for experimental plats were also shipped in, with 1½ tons of commercial fertilizer and some minor supplies. A small thrashing machine had been ordered, but was not shipped, owing to the manufacturers not having time to build it. Since there was quite a quantity of grain to thrash, a simple machine was devised by the superintendent. Driven by the 6-horse marine engine, this machine did effective work, thrashing about 2 tons of barley and oats.

A horse was transferred from the Fairbanks Station to this station this summer, making three head of horses at the Rampart Station.

As in preceding years, garden seeds received through the United States Department of Agriculture were distributed as called for, also station-grown barley, oats, wheat, and turnip seed, all in small quantities. The ever-increasing interest shown in gardening and field crops indicates that the people are realizing more and more the possibilities of the soil and climate, and points to the time when the agricultural products of the Yukon and Tanana Valleys will be no inconsiderable factor in the food supply of Alaska.

WINTER GRAIN.

The winter of 1910-11 proved to be a hard one on winter grain, especially winter wheat. One-fourth acre of Kharkov wheat was sown, but only 25 per cent of that survived. Another plat of wheat killed out entirely, and still another all but 1 per cent froze out.

The various plats of rye made a creditable showing, producing large, well-filled heads, which ripened thoroughly by the middle of August. The following table gives the varieties of winter grain grown and some of the data regarding them. (Pl. V, figs. 1 and 2.)

Report on winter grain at Rampart Station, 1911.

Variety.	Spring survival.	Date ripe.	Height.	Length of heads.	Grains per head.	Source of seed.
	Per cent.		Inches.	Inches.		
Kharkov wheat, 12001B4.....	25	Aug. 10	36	3	45	Station.
Klondyke wheat, 10-A.....	1	Aug. 11	36	3	48	Department.
Giant French rye, 14-B4.....	50	Aug. 12	48	4½	50	Station.
Amber rye, 15-B4.....	25	do.....	48	4	40	Do.
Wheat, 4-A.....						Department.
Rye, 5-B.....	25	Aug. 13	38	3	45	Station.
Rye, 281-B1.....	60	Aug. 14	40	4½	60	Do.
Rye, 959-B1.....	75	do.....	40	3½	50	Do.
Rye, 1134-B3.....	75	do.....	40	3½	48	Do.
Rye (Excelsior), 13-B4.....	30	do.....	38	3	40	Do.
Barley, 11-B3.....						Do.

PEDIGREED AND HYBRID GRAINS.

The selection of the best and earliest heads of grain with a view to improving the strain has been continued. The results of such work, though slow to materialize, are nevertheless valuable. Plats growing pedigreed grains are necessarily small and are designated as B plats. The numeral suffixed to the letter B shows now many years that particular variety has been pedigreed. The letter A is used to designate new varieties. The letter D indicates increase plats and the letter F fertilizer plats. Hybrids are numbered in accordance with the method used in the Bureau of Plant Industry of the United States Department of Agriculture.

The crossbreeding of barley was begun three years ago, and this year some of the first crosses were grown in plats adjacent with the standard varieties and in comparison made a very fine showing indeed. The accompanying plate (Pl. V), showing individual heads of both parents and the resultant cross, shows a decided gain in some instances of size at least. From the table it may be seen that these hybrids also possess earliness and stiffness of straw. Hybrid 3a-6-1 proved to be in point of earliness fully the equal of Pamir, the earliest barley grown here. The hybrid is also larger and, moreover, is beardless. Much more needs to be done along the line of crossbreeding, for it would be a miracle, indeed, if in the short

time this work has been under way a new variety fully meeting all requirements could have been produced.

A number of additional crosses were made this year, using hull-less barley S. P. I. 12709 as the mother plant and pollen from several bearded varieties, notably Swedish, S. P. I. 19557; Pamir, S. P. I. 18922; Abyssinian, G. I. 362, a black two-rowed barley; and Koyukuk, a hooded six-rowed type, resulting from a cross made at the Copper Center Station several years ago. Unfortunately the dry, windy weather shortened up the blooming period of all grains this year, consequently not nearly as much of this work was done as had been planned.

The following table shows the more salient points regarding the pedigreed and hybrid grains.

Description of hybrid and pedigreed barleys at Rampart Station.

Variety and number.	Date ripe.	Days matur-ing.	Height.	Character of heads.	Length of heads.	Grains per head.	Lodged.	Rows per head.
<i>Inches.</i>								
Abyssinian, 360B5.....	Aug. 6	82	36	Bearded.....	3	48	-----	6
Abyssinian, 361B5.....	Aug. 5	81	40	.....do.....	3	54	-----	6
Abyssinian, 362B5.....	do.....	81	34	.....do.....	3	16	-----	2
Manshury, B5.....	Aug. 7	83	42	.....do.....	3.5	54	-----	6
Swedish, 19557B3.....	Aug. 4	81	40	.....do.....	2.5	48	-----	6
Champion, 86B.....	Aug. 8	84	42	Beardless.....	2.75	42	-----	6
Hull-less, 87B.....	Aug. 9	85	56	.....do.....	2.75	48	-----	6
Eagle, 88B2.....	Aug. 10	86	41	Bearded.....	3	26	-----	2
Koyukuk, 89B.....	Aug. 8	84	40	Hooded.....	3	48	-----	6
Chittyna, 90B2.....	Aug. 9	85	40	.....do.....	3	50	-----	6
Hull-less, 19851B3.....	Aug. 15	91	36	Beardless.....	3	44	-----	6
Hull-less, 12709B3.....	Aug. 10	86	38	.....do.....	3	46	-----	6
Pamir, 18922B3.....	Aug. 3	80	25	Bearded.....	1.75	30	-----	6
Primus, 93B.....	Aug. 12	88	42	.....do.....	2.75	22	-----	2
Hybrid, 2a-1-1.....	Aug. 5	81	48	Hooded.....	3	48	25	6
Hybrid, 3a-1-1.....	do.....	81	48	.....do.....	3	48	25	6
Hybrid, 3a-6-1.....	Aug. 3	80	38	.....do.....	2.5	36	-----	6
Hybrid, 4a-1-1.....	Aug. 6	82	40	.....do.....	2.75	42	-----	6
Hybrid, 5a-1-1.....	Aug. 5	81	44	.....do.....	2.74	48	-----	6
Hybrid, 6a-1-1.....	Aug. 6	82	40	.....do.....	2.75	48	-----	6
Hybrid, 7a-1.....	Aug. 9	89	41	.....do.....	3	48	-----	6
Hybrid, 4a-1-1.....	do.....	89	42	.....do.....	4	60	-----	6
Hybrid, 9-1.....	Aug. 16	96	42	Bearded.....	3	36	-----	2
Hybrid, 10a-1.....	Aug. 9	89	40	Hooded.....	3.25	52	25	6
Hybrid, 11a-1.....	do.....	89	38	.....do.....	3	48	-----	6
Hybrid, 12a-1.....	Aug. 7	87	39	.....do.....	3	48	-----	6

Description of pedigreed oats at Rampart Station.

Variety and number.	Date ripe.	Days matur-ing.	Height.	Color of berry.	Length of heads.	Grains per head.	Lodged.	Type paniced.
<i>Inches.</i>								
Norwegian, 500B3.....	Aug. 12	92	42	Black.....	8	60	-----	Spreading.
New Swedish, 96B.....	Aug. 15	95	42	White.....	5.5	52	-----	Do.
Finnish Black, 97B3.....	Aug. 10	90	48	Black.....	8	90	-----	Do.
Copperfield, 98B1.....	Aug. 11	91	38	Gray.....	6	64	-----	Do.
Minnesota, 261B.....	Aug. 10	90	38	White.....	5.5	30	-----	Do.
South Dakota, 637B1.....	do.....	90	44	Black.....	8	90	-----	Do.
Hansen, 27B.....	Aug. 15	95	42	White.....	7	70	-----	Do.
Yakutsk, 498B3.....	Aug. 8	88	38	.....do.....	4.5	34	-----	Do.
Banner, 106B1.....	Aug. 10	90	47	.....do.....	7	70	-----	Do.

NEW VARIETIES OF GRAIN.

Every year a number of new varieties of grain are tried. These are gathered up from various sources (by the special agent in charge) as will be seen from the following tables. The tables on page 38 gives the new varieties of barley grown for the first time this year and also the new varieties of oats. Nearly all the new barleys were rather disappointing. Many of them had very weak straw, while those not lodging had small heads. Barbary, G. I. No. 695, originally from North Africa, resembles very closely Pamir, S. P. I. 18922, which came some years ago from the Himalaya Mountains. Both have very short straw and short heads, but Pamir ripened seven days earlier than did Barbary. Varieties of Urvjala and Finland, both from the experiment station at Dickursby, Finland, are worthy of further trial. Urvjala is stiff strawed, bearded, and quite early for a two-rowed type, while Finland has very short, square, and thick-set heads, with long, stiff beards. The latter will be used in the crossbreeding work next year. Out of the total 25 new varieties grown this year only 3 were beardless. These will be given further trial, although none of the three is equal to the hull-less barley, S. P. I. 12709, that has been grown here for four years.

Of the 10 new varieties of oats, several are promising. The first 5 given in the table are simply different strains of Finnish Black, an oat that has done well here for several years. Of these 5, Kurbijoho seems to be the best as regards size of heads, with Orismala second. Black Tartarian is the most promising of any of the new varieties. The heads are large, well filled, and though not ripening very early, are sufficiently early to escape all danger of fall frosts. The panicles are arranged on one side of the head.

New varieties of barley tested at Rampart Station.

Variety and number.	G. I. No.	Plat No.	Date ripe.	Days maturing.	Height.	Character of heads.	Length of heads.	Grains per head.	Rows per head.	Lodged.	Source of seed.
Abyssinian.....	668	1A	Aug. 16	93	42	In.	c. m.	8.5	16	2	Department.
Do.....	669	2A	Aug. 15	92	44	do.....	8.5	18	2	Do.	
Do.....	670	3A	Aug. 16	93	44	do.....	7.5	48	6	Do.	
Do.....	675	7A	Aug. 14	91	46	do.....	7.5	45	6	Do.	
Do.....	676	8A	do.....	91	46	do.....	7	45	6	Do.	
Do.....	672	4A	Aug. 16	93	46	do.....	7.5	39	6	Do.	
Do.....	673	5A	do.....	93	45	do.....	5	39	6	100	
Do.....	674	6A	Aug. 14	91	45	do.....	7	42	6	Do.	
Heils Hanna No. 1.....	681	10A	Aug. 18	95	34	do.....	8	20	2	100	
Heils Hanna No. 2.....	678	11A	Aug. 16	93	39	do.....	9	20	2	100	
Heils Hanna No. 3.....	682	12A	Aug. 17	94	39	do.....	9	20	2	100	
Heils Hanna No. 4.....	677	9A	Aug. 16	93	44	do.....	8.5	16	2	100	
Franconian.....	679	13A	Aug. 18	95	38	do.....	10	22	2	100	
Improved Franconian.....	680	14A	do.....	95	39	do.....	10	20	2	100	
Salamanca.....	689	15A	Aug. 17	94	40	do.....	8	54	6	100	
Washington.....	691	16A	Aug. 16	93	36	do.....	7.5	48	6	20	
Barbary.....	695	17A	Aug. 10	87	24	do.....	6	30	6	Do.	
Black Russian (winter variety).....	705	18A	.....	.....	.....	.....	.....	.....	.....	Do.
White Russian (winter variety).....	706	19A	.....	.....	.....	.....	.....	.....	.....	Do.
Peru.....	707	20A	Aug. 10	87	34	Bearded ..	5	36	6	.....
Urjala.....	.....	21A	do.....	87	43	do.....	7.5	22	2	Dickursby, Finland.
Finland.....	.....	22A	Aug. 6	83	43	do.....	5	54	6	Do.
Hull-less.....	220	23A	Aug. 10	87	36	Beardless ..	8	48	6	2	
Ideal, white.....	24A	do.....	87	36	do.....	do.....	6.5	48	6	W y o m i n g Expt. Sta.	
Success.....	25A	Aug. 8	85	36	do.....	do.....	6.5	36	6	Iowa Seed Co. Do.	

New varieties of oats tested at Rampart Station.

Name.	Plat No.	Date ripe.	Days maturing.	Height.	Character of head.	Length of heads.	Grains per head.	Color of berry.	Lodged.	Source of seed.
Orismala, Finnish Black.	25A	Aug. 5	81	In. 49	Spreading.	c. m. 20	80	Black.....	P. ct.	Dickursby, Finland.
Toaulahti, Finnish Black.	26A	Aug. 7	83	47	do.....	19	70	do.....	Do.	Do.
Ruovesi, Finnish Black.	27A	Aug. 5	81	49	do.....	20.5	70	do.....	Do.	Do.
Kurbijoho, Finnish Black.	28A	do.....	81	49	do.....	27	100	do.....	Do.	Do.
Toholampi, Finnish Black.	29A	Aug. 4	80	40	do.....	14	60	do.....	Do.	Do.
Silver Mine.....	30A	Aug. 16	92	37	do.....	15	60	White.....	.....	Iowa Seed Co.
Black Tartarian.....	31A	do.....	92	39	Side.....	16	106	do.....	Do.	Do.
Kherson.....	32A	Aug. 8	84	29	Spreading.	13	32	Yellow.....	Do.	Do.
Irish Victor.....	33A	Aug. 16	92	40	do.....	14	28	do.....	Do.	Do.
Early Champion.....	34A	Aug. 8	84	30	do.....	12	38	do.....	Do.	Do.

FERTILIZER TESTS.**OATS.**

In order to determine as quickly as possible just what food elements the soil here requires a series of tests similar to those of last year was devised. It will be seen from the table that three varieties of oats were used in identical arrangement, using the three different ferti-

lizers singly and combined at the rate of 500 pounds per acre. The ground where these plats were laid off had been in potatoes the year before and had been given a dressing of complete fertilizer at that time. The soil was in excellent condition and of uniform character throughout the field. The ground had been fall plowed and was harrowed only in the spring. The fertilizer was broadcasted before seeding and harrowed in well. The oats was seeded with a 2-horse grain drill and the stand was all that could be desired.

Throughout the series sodium nitrate gave the highest yields. Then the mixture of all three fertilizers in equal parts, followed by potassium sulphate, and lastly superphosphate. Taking an average of the three series, the percentages of increase are: Sodium nitrate 22, the mixture 14, potassium sulphate $12\frac{1}{2}$, and superphosphate $2\frac{1}{3}$. These results are, in the main, consistent with those of last year. As might be expected, the plats treated with sodium nitrate produced a ranker growth of straw than did any of the others and the grain was several days later in ripening. There were no other appreciable cultural differences.

All fertilizer experiments thus far conducted indicate that nitrogen is the element deficient in the soil. The addition of phosphorus and potash has given beneficial results, but not invariably nor so markedly. Doubtless it will pay to use a complete fertilizer, but the nitrogen-yielding ingredient should preponderate.

Now that such preliminary tests as were made last year and again this year have indicated broadly the soil requirements, more comprehensive tests should be undertaken, extending over a series of years. Uniform test plats of not less than one-tenth acre each should be staked off and given a preliminary cropping to determine the soil differences of the several plats. For, as is well known, adjacent plats given identical treatment will not as a rule produce alike. A sufficient body of land, suitable for the above purpose, is now available and the work could begin next season.

Fertilizer test with oats.

Variety.	Size of plat.	Seed per acre.	Fertilizer, 500 pounds per acre.	Height.	Date ripe.	Yield.	Rate per acre.	Gain.
Sixty Day.....	Acre. .025	Pecks. $\frac{1}{2}$	Potassium sulphate.....	Inches. 36	Aug. 16	Pounds. 71	Bushels. 88.7	P. ct. 10
Do.....	.025	$\frac{1}{2}$	Superphosphate.....	36	do.....	66	82.5	3
Do.....	.025	$\frac{1}{2}$	None.....	36	do.....	64	80	
Do.....	.025	$\frac{1}{2}$	Sodium nitrate.....	36	Aug. 19	73	91	14
Do.....	.025	$\frac{1}{2}$	Mixed equal parts.....	36	Aug. 16	66	82.5	3
Black Great Mogul S. P. I. 20464.	.025	$\frac{1}{2}$	Potassium sulphate.....	42	Aug. 19	81	101	10
Do.....	.025	$\frac{1}{2}$	Superphosphate.....	42	do.....	76	95	4
Do.....	.025	$\frac{1}{2}$	None.....	42	do.....	73	91	
Do.....	.025	$\frac{1}{2}$	Sodium nitrate.....	42	Aug. 24	96	120	32
Do.....	.025	$\frac{1}{2}$	Mixed equal parts.....	42	Aug. 19	92	115	26
Finnish Black.....	.025	$\frac{1}{2}$	Potassium sulphate.....	43	Aug. 4	41	51	5
Do.....	.025	$\frac{1}{2}$	Superphosphate.....	43	do.....	39	48.7	
Do.....	.025	$\frac{1}{2}$	None.....	43	do.....	39	48.7	
Do.....	.025	$\frac{1}{2}$	Sodium nitrate.....	43	Aug. 6	47	58.7	20
Do.....	.025	$\frac{1}{2}$	Mixed.....	43	Aug. 4	44	55	13

Plat yields of oats and barley at Rampart Station.

Variety.	Size of plat.	Rate seeded.	Date ripe.	Height.	Yield.	Rate per acre.
OATS.	Acre.	Pecks.		Inches.	Pounds.	Bushels.
Sixty Day, G. I. 666.....	.025	10	Aug. 16	36	340	85
Black Great Mogul, S. P. I. 20464.....	.125	10	Aug. 19	42	418	104.5
Finnish Black.....	.125	10	Aug. 4	43	210	52.5
Banner.....	.025	10	Aug. 10	46	100	125
Yakutsk, G. I. 498.....	.125	10	Aug. 5	36	100	25
BARLEY.						
Chittyna.....	.025	8	Aug. 7	44	60	50
Hull-less, S. P. I. 12709.....	.050	6	do.....	48	180	60
Koyukuk.....	.025	8	Aug. 8	48	62	51.6

The above table gives the yields of various plats of barley and oats. The data given for Sixty Day, Black Great Mogul, and Finnish Black are the totals of the series of each of the five fertilizer plats given in table on page 39. These three are therefore comparable one with the other. The three varieties of barley were also grown under like conditions and results may therefore be compared. Banner oats was grown on soil of the same character and in the same crop rotation as the first three varieties, but the plat for Banner oats was not fertilized this year, while the others were. Just why this plat should have made such a high yield, compared with fertilized plats, is one of the anomalies sometimes met with in experimentation. Yakutsk oats is naturally a light yielder and in this case was grown on ground that had never been fertilized, so no comparisons should be made. This table is given, primarily, as a matter of record.

FERTILIZER TEST WITH POTATOES.

Six rows of the variety known as Gold Coin were used in this test. The ground had been cropped the previous year with grain and had not been fertilized for that crop. The field was thoroughly disked and put in excellent condition. The seed was hand dropped in a furrow and covered with a hoe, filling the furrow level. The fertilizer was drilled in on top of the row, going over each row twice, which distributed the fertilizer quite evenly. The potatoes were cultivated once by hand and several times with a cultivator, all being worked alike. Each of the six rows extended the length of the field where the ground was of practically the same character. Two check rows were planted and their average used in making up the data given on the yields. This table shows that the row treated with sodium nitrate gave the highest yield, with an increase of 51 per cent over the untreated row. Then came the row treated with mixed fertilizer in equal parts, showing an increase of 26 per cent, and in the order named, superphosphate 18 per cent and potassium sulphate 0.6 per cent. The fertilizer was applied at about the rate of 500 pounds per acre. Early in the season the row treated with

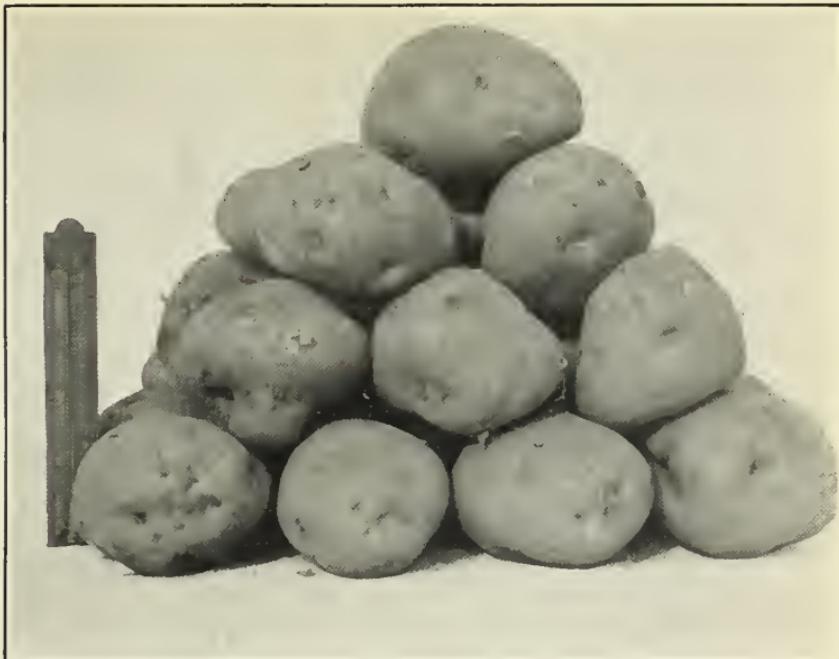


FIG. 1.—IRISH COBBLER, A VARIETY OF POTATO ADAPTED TO ALASKA.

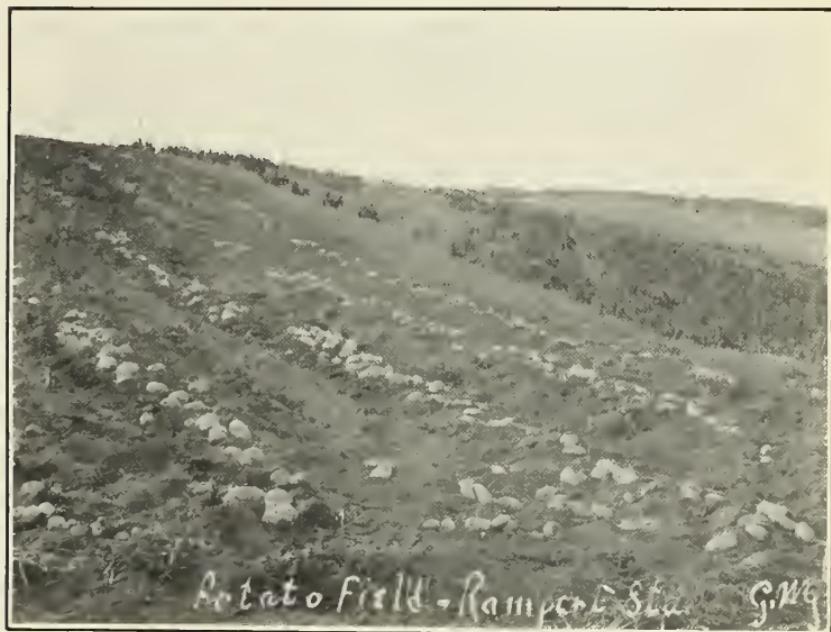


FIG. 2.—POTATO FIELD AT RAMPART STATION.

nitrate showed a marked increase in size of vine and depth of color, but this difference was not maintained throughout the season. The blooming period was the same for all rows. The results of this test correlate very closely the grain-fertilizer tests made at this station, all pointing to nitrogen as the missing element.

Fertilizer test with potatoes.

Variety.	Size of plat.	Fertilizer used.	Yield.	Rate per acre.	Increase.	Increase.
			Pounds.	Bushels.	Bushels.	Per cent.
Gold Coin...	1 row	Superphosphate.....	151	261	41	18
Do.....	do.....	Sodium nitrate.....	193	333	113	51
Do.....	Average 2 rows.	None.....	127	220		
Do.....	1 row	Potassium sulphate.....	135	233	13	6
Do.....	do	Mixed, equal parts.....	160	277	57	26

POTATOES, GENERAL CROP.

A little over $1\frac{1}{2}$ acres were planted this year with a view, mainly, to using this crop in rotation with grain. About one-half of the field was given a light dressing of stable manure in the spring, and although the ground had been plowed in the fall it turned over well and made an ideal seed bed. After the potatoes were planted a complete home-mixed fertilizer was drilled in, using about 400 pounds per acre. This amount proved to be insufficient, but it was all that could be spared for this crop. Level culture was practiced from the first and continued until the potatoes were blooming.

There were two large knolls in the field and on these the ground became so dry during June that the seed remained dormant until the late summer rains. Elsewhere the stand was good. The total yield was $3\frac{3}{4}$ tons. Had the field been more nearly level the yield would have been considerably larger.

The varieties grown were chiefly: Extra Early Eureka, Extra Early Pioneer, Extra Early Triumph, Irish Cobbler, Gold Coin, Hamilton Early, and Early Ohio. All are of good quality and seem well adapted to interior conditions. However, it is worth mentioning that Triumph has a tendency to grow misshapen, putting out knotty excrescences. Hamilton Early is just the opposite, producing unusually fine, smooth tubers and a clear white skin, which is rather too tender to stand much handling. In the latter regard, Irish Cobbler is well adapted to culture here, since the skin seems to toughen more than on any other variety tried; a matter of considerable importance when one remembers that few if any potatoes actually ripen. (Pl. VIII, fig. 1.) Consequently the skin does not have time to attain its maximum toughness.

With a view to increasing the yield and maintaining the type, seed selection by the individual hill method was continued this fall. As practiced here this was accomplished at digging time easily and rapidly. The potatoes were plowed out, one row at a time, with

a 12-inch turning plow. (Pl. VIII, fig. 2.) By regulating the depth of the furrow properly the furrow slice was turned upside down very evenly, exposing each hill practically intact. It was then an easy matter to pass along the row and select the hills that came up to the standard set for that particular variety. This method is much easier and just as efficient, where the hills are not too close in the row, as trying to find the best hills by noting the growth of vines and then digging each hill separately.

About a pound of each of the 41 varieties of potatoes given in the following table was planted. The seed which was sent in the previous fall was not very choice in the majority of instances, being small and soft. This fact may account for the low yields of these varieties. The increase will be planted next year in order to test the relative merits of each.

New varieties of potatoes.

Variety.	Number of hills.	Yield.	Description of tubers.			
			Color.	Eyes.	Shape.	Size.
Burpee Superior.....	8	Pounds. 10 $\frac{1}{2}$	White.....	Medium deep.	Oblong, flattened.....	Average large.
Snow Ball.....	13	7	Pink.....	Medium.....	Roundish.....	Medium.
Green Mountain.....	8	7	White.....	Shallow.....	Roundish, flattened.....	Do.
Money Maker.....	4	2	.....do.....	.....do.....	Roundish.....	Small.
Late Puritan.....	2	2	.....do.....	Medium deep.	Oblong.....	Very large.
McCormick.....	7	3	Red.....	.....do.....	Roundish.....	Small.
White Plume.....	11	6	White.....	Shallow.....	Roundish, flattened.....	Do.
Dakota Red.....	7	4	Red.....	Deep.....	.....do.....	Medium.
Columbus.....	9	4	Pinkish.....	Medium shallow.	Roundish, oblong.....	Small.
Late Rose.....	12	8	White.....	Shallow.....	Ohlong, flattened.....	Medium.
Empire State.....	13	7	.....do.....	Very shallow.....	Oblong.....	Medium to large.
Early Fortune.....	9	6	.....do.....	Medium shallow.	Flattened, broad ends.	Medium.
Knowles Big Cropper.....	7	10	.....do.....	Very shallow.....	Oblong, flattened.....	Very large.
Lily White	7	7 $\frac{1}{2}$	.....do.....	Medium shallow.	Flattened, broad.....	Large.
Commercial.....	11	5	Red.....	Medium deep.	Roundish.....	Do.
Rust Proof.....	5	4	White.....	Medium shallow.	Oblong.....	Medium.
Woods Earliest.....	16	11 $\frac{1}{2}$	White and pink.	Medium deep.	Roundish.....	Do.
Northern Beauty.....	4	3	Red.....	Deep.....	Roundish, oblong.....	Do.
Rural New Yorker No. 2.	3	2	Yellowish.....	Medium shallow.	Flattened, oblong.....	Small.
Fillbasket Early.....	8	4 $\frac{1}{2}$	Red.....	.....do.....	Roundish, oblong.....	Medium.
Market Prize.....	11	7	Pink.....	Shallow.....	Long, flattened.....	Do.
Clark Seedling.....	12	6 $\frac{1}{2}$	White.....	.....do.....	Roundish, flattened.....	Do.
Express.....	10	5	Red.....	Medium deep.	Roundish.....	Do.
Keeper.....	9	5	.....do.....	Medium shallow.	.....do.....	Do.
Sutton Early Monarch.....	8	3 $\frac{1}{2}$	White.....	Very shallow.....	Roundish, flattened.....	Do.
Carman No. 1.....	9	7	.....do.....	.....do.....	Very flat.....	Do.
Extra Early Vermont.....	9	7	Reddish.....	Shallow.....	Oblong, flattened.....	Large.
Mammoth Pearl.....	11	11	Pinkish.....	.....do.....	Roundish, long.....	Medium.
White Giant.....	6	2 $\frac{1}{2}$	White.....	Medium deep.	Decidedly roundish.	Small.
Early Beauty of Hebron.....	3	2	.....do.....	Medium shallow.	Elongated, flattened.....	Medium.
Late Beauty of Hebron.....	4	1 $\frac{1}{2}$	Pinkish.....	.....do.....	Roundish.....	Small.
Bliss Triumph.....	6	4	White.....	Shallow.....	Flat, elongated.....	Medium.
The Thorburn.....	22	9	Reddish.....	Very deep.....	Decidedly roundish.....	Do.
State of Maine.....	12	5	Red.....	Medium shallow.	Elongated, roundish.....	Do.
Early Six Weeks.....	8	5	White.....	Shallow.....	Flat, roundish.....	Do.
Million Dollar.....	6	3	.....do.....	Very shallow.....	Flat, elongated.....	Do.
Lightning.....	6	4 $\frac{1}{2}$	.....do.....	Shallow.....	Roundish, irregular.....	Large.
Cambridge.....	9	3 $\frac{1}{2}$	.....do.....	.....do.....	Flat, elongated.....	Small.
Norton Beauty.....	4	3 $\frac{1}{2}$	.....do.....	Deep and pink	Decidedly roundish.	Large.
Norcross.....	5	5	.....do.....	Very shallow.....	Flattened, roundish.....	Medium.

GRASSES AND LEGUMES.

The 1 acre of *Bromus inermis* seeded two years ago came through the second winter in excellent shape and made an early spring growth. Later it seemed to receive a setback, so that the final crop was not as good as it at first promised to be, although the acre yielded fully a ton of fine hay. The one-fourth acre of timothy seeded at the same time as the *B. inermis* was disappointing. It wintered perfectly, but made a very light yield of hay. None of this ground has ever been manured, and observations here indicate that timothy will not yield a satisfactory crop on unfertilized ground.

Red fescue, S. P. I. 19796, passed the winter in perfect shape. This grass has round, glaucous leaves of a bluish-green color. No seed stalk was sent up. This grass has a tendency to grow in bunches and it seems to possess remarkable winter resistance. In the spring the previous season's growth remained green and continued to grow instead of dying back and putting forth anew from the roots as other grasses do here. For this reason it may prove to be a valuable pasture grass for this country. Kentucky bluegrass sown in the yard around the house three years ago continues to do well despite the dry location and the lack of sufficient rain. If water could be applied when needed as beautiful a lawn could be had here as in the States. While in Fairbanks this summer the writer saw as fine a lawn of Kentucky bluegrass as could be found anywhere.

The following legumes seeded in the spring of 1909 came through their second winter in good shape: *Vicia cracca*, S. P. I. 2446; Montana alfalfa, S. P. I. 23454; Grimm alfalfa, S. P. I. 21837; sand lucern, *Medicago falcata*, S. P. I. 24452; and alsike clover, S. P. I. 18547. The first and last named only produced seed. All made a fair growth, *V. cracca* producing a vinous stalk 4 feet long, while the alsike clover stood about 16 inches high and very thick. The alfalfas grew to a height of from 20 to 26 inches and podded freely, but none of the seed ripened.

Below are given the names and numbers (S. P. I.) for the alfalfas seeded in small trial plats this spring: Abey, seed from Ogden, Utah; Mongolian, 21282; Grimm, 21735; *Medicago ruthenica*, 24451; sand lucern, 28882; *Trifolium lupinaster*, 24458; *M. falcata*, 24452; and Turkestan alfalfa. The last named made a fine growth and was mowed the first week in September. Some of the others did not start off well, notably *T. lupinaster*, *M. ruthenica*, and *M. falcata*.

The cultivation of alfalfa will more and more take a prominent place in the work of this station, for it is realized that to a marked degree future agriculture will depend largely on this hardy perennial to supply the most expensive element this soil lacks, namely, nitrogen.

Several hundred alfalfa plants were received from the Sitka Station this summer. These were promptly set out and have made a fair growth, although, as might be expected, not all lived. Coming as they did nearly 2,000 miles by mail, and with slow transportation, it is a wonder that any of them lived. Only the most careful packing could do it.

The varieties of alfalfa received are: Cherno, Cossack, Semipalitinsk, North Sweden, Omsk, and Gobi Desert.

NURSERY STOCK.

Some nursery stock was also received from the Sitka Station June 17. Both trees and bushes were badly sprouted when taken from their wrappings, but this could not be avoided. All the trees grew and by the end of the season had made growths of new wood from 6 to 12 inches long. Of the gooseberries, 3 out of the 15 died, but the others, as well as the currants, have made a very good start. The plum trees are some of Prof. N. E. Hansen's creations and came originally from Brookings, S. Dak., as did also the alfalfa plants given above.

The list of nursery stock follows: One each of Kaga, Skuya, Wakapa, Eyami, Hanska, and Opata, and 2 of Wohanka and Okiya plums; 15 gooseberry plants, 24 currants, 12 Yellow Transparent apple trees, 18 Grant apple trees, 2 each Enopa, Etopa, and Sapa apples, 5 Charlamoff apple trees, and 12 Iowa Beauty apple trees.

THE GARDEN.

This year the garden was changed to a new location and did not do quite as well as last year. The ground needs more fertilization and this need will be supplied in the spring. Congressional seeds were used almost exclusively, the exception being sugar beets, peas, and turnips. The peas and turnip seed were home grown. Of peas, Alaska, Extra Early, Nott Excelsior, Premium Gem, Northwest Premier, and Prince of Wales were grown. Nott Excelsior, Premier Gem, and Northwest Premier are dwarf varieties and rank about equal in points of excellence. Seed was allowed to ripen on Nott Excelsior and this variety will be grown exclusively from station seed. Alaska and Extra Early also resemble each other very closely, producing a vigorous growth of vines and an abundance of medium-sized pods. Both are very early. The Alaska variety will be pedigreed to note if the seed maintains its vigor. Station-grown seed of the Alaska variety has been used for three successive years and in a couple of instances, where it has been planted adjacent to seed of the same variety from the States, has produced the more vigorous plants. Prince of Wales is a large podded, prolific sort, but rather late, though it might prove profitable for market gardeners.

Cauliflower (Early London, Dwarf Erfurt, and Early Alba) did not do well. The entire crop was nearly ruined by root maggots. Cabbage (Danish Ballhead, Early Jersey Wakefield, Early Winningstadt, and Early Summer) did well in part only. Winningstadt made fine heads and most of the Wakefield, but few of the others made really first-class heads. They are not early enough. It is worthy of note that none of the cabbage plants were injured by root maggots, though grown from seed in the same hotbed and transplanted at the same time to the garden. Turnips and radishes were also badly infested with root maggots. The radish crop was worthless and many of the white turnips likewise. The yellow turnips (Golden Ball and Petrowski) were but slightly affected. Next spring steps will be taken to prevent the ravages of the root pests.

For the first time a few sugar beets were grown, but few attained commercial size. The varieties were Kleinwanzleben and French White. They will be given another trial. Swiss chard was also grown for the first time and proved to be one of the best plants for greens ever grown here. The leaves are sweet and tender and were cut repeatedly. Most plants grown for greens, such as mustard and spinach, run to seed early in the season and are of little value ordinarily. For fall and winter use, kale is one of the best plants to grow for greens.

REPORT OF WORK AT FAIRBANKS STATION.

By J. W. NEAL, *Superintendent.*

The plans formerly outlined for the Fairbanks Station have been changed in some measure, dropping the small plat experiment and plant-breeding work, with a view to applying our entire energies to that of more general farming and further improvement of the station. The purpose of this is to demonstrate the possibility of farming for profit in Alaska.

Since our last report we have cleared 23 acres of land, $2\frac{1}{2}$ acres of which were cleared in May and planted in potatoes. The station now has 93 acres cleared, 70 of which are already under cultivation.

Some improvements to the buildings have been made (Pl. IX, figs. 1 and 2).

The barn has been extended 30 feet and the proposed 16 by 60 feet lean-to shed added to the building.

The cottage and greenhouse have been painted with green stain, and materials are in store for painting the barn and other outbuildings a Venetian red. A root cellar has been built in the hill to the rear of the former blacksmith shop, with an entrance through the shop building. The cellar is 15 feet wide and extends 61 feet into the hill, with an 8-foot ceiling. The rear end is entirely under ground

some 3 feet. Three sides are lined with lumber, and 6 by 6 inch posts with bridge lumber decking support 3 feet of earth overhead. The rear end is left unlined, with a view to extending the cellar on into the hill by tunneling when more cellar space is needed. The shop roof was extended 30 feet back toward the hill over the cellar and covered with roofing paper. The former shop building will be used as a curing or drying room at digging time and a sorting room during the winter months by using a flat car which runs on a track, extending from the platform in front of the sorting room to the back end of the cellar. A short section of portable track is lifted when closing the double doors at the cellar entrance. An air-tight heating stove will warm the sorting room when necessary, and in extreme cold weather a current of warm air can be carried into the cellar through the ventilator pipe over the entrance doors by connecting it with a sheet-iron casing around the stove. This casing is made in two sections, the front half being used when forcing the heat through the pipe into the cellar. The hot-air pipe is connected with the cellar ventilator pipe only when heat is needed. It is to be hoped, however, that the cellar will prove to be frost proof without artificial heat. Ventilators are also provided in the ceiling at the back end of the cellar.

A new and smaller building is already under way to replace the blacksmith shop and tool house.

Considerable fencing has been done this year, including a board fence around the barn and other buildings.

WEATHER CONDITIONS.

In comparing one season with another it is found that the weather behaves very peculiarly. Last season (1910) was quite favorable to growing crops during the early season, changing to the other extreme about midsummer, and it continued cold, with frequent showers and killing frosts through the remainder of the season, while this season was almost the opposite.

This season opened a little later than usual and continued cold and wet with little sunshine until June 1, when the weather suddenly turned warm and dry with an unusual amount of sunshine. These conditions prevailed until well into August, with the exception of two or three light frosts in the lowlands, late in July and early in August. Cold, rainy weather set in late in August, which made it very difficult to finish curing and storing the hay crop. Several light frosts occurred in the lowlands during the last week in August, and on August 31 potatoes and other tender plants were killed all over the valley. The temperature fell to 28° F. at the station and as low as 20° F. at Fairbanks and on the lowlands. Another peculiar feature of the weather this season is that all of September passed

with little or no frost at the station, and the ground did not freeze to stop plowing before October 20.

VEGETABLES.

As heretofore reported, a small greenhouse 12 by 20 feet has been built at the station. (Pl. X, fig. 1.) A propagating house of some sort is indispensable on an interior Alaska farm. It is needed in starting plants which must later be transplanted to the open, and when these are out of the way it is utilized for tomatoes, cucumbers, lettuce, and the like with much success.

Tomatoes started under glass and set out in the open garden early in June made excellent growth and bore a fair crop of green tomatoes, which had just started to ripen when the vines were killed by the heavy frost of August 31. A number of the vines bore 10 to 12 pounds and none had less than 5 pounds. Seventy-five per cent of the tomatoes from these vines run from 3 to 6 ounces in weight. (Pl. X, fig. 2.)

Cabbage from department seed, marked Early Jersey Wakefield, made heads weighing from 8 to 12 pounds. Cauliflower was as fine as can be grown in any country. Turnips, rutabagas, carrots, rhubarb, horseradish, and other hardy vegetab'es did very well.

POTATO CULTURE.

In former years potato culture has been greatly discouraged in this country by those who held the idea that a firm and mealy potato could not be raised in so short a season. It has now been proven that, with the proper selection of seed, soil, and good cultivation, a potato of excellent quality can be grown and potatoes are fast becoming the principal crop of the country.

A soil with a southern exposure should be selected for potato growing, and it is well to select land that has been timbered with trees that shed their leaves, such as the birch or quaking aspen. The south hillsides drain off the melting snow quickly, and the ground is warmer than level land. The annual crop of leaves from these deciduous trees for many years has enriched the soil so much that when it is broken up and worked down to the proper fineness it makes a dark, loose, and loamy soil, very friable in texture.

For best results the potato ground is fall plowed, and after disk-ing well in the spring it is replowed and then disked and harrowed until it is like a well-prepared garden. The tubers are planted in rows 3 feet apart, the seed pieces being placed 12 to 16 inches apart in the row, and covered from 1 to 2 inches deep. After cultivating them twice they are ridged up about 3 inches deeper with a home-made shovel plow. The shovel is short but very broad, and by run-

ning it in the middle between rows it throws a good ridge of dirt over the growing tubers. This ridging acts as a sort of mulching and also makes the soil warmer about the roots of the plants, which induces a more rapid growth. Several varieties were grown in small lots this year under the above conditions, on ground which has been cropped for three years without fertilizers of any kind. Records were kept of the dates of planting and digging. The yield of each variety has been carefully figured out from 100-foot rows to acre lots for more easy comparison.

Test of varieties of potatoes at Fairbanks Station, 1911.

Variety.	Planted.	Dug.	Yield per acre.	Variety.	Planted.	Dug.	Yield per acre.
<i>Pounds.</i>							
Early Market.....	June 9	Sept. 22	10,456	Garfield.....	June 10	Sept. 22	13,358
Bovee.....	do.....	do.....	13,794	Freeman.....	do.....	do.....	11,616
Extra Early.....	do.....	do.....	14,955	Extra Early Ohio.....	do.....	do.....	10,164
Butkees Own.....	do.....	do.....	18,004	Snowflake.....	do.....	do.....	10,164
Early Harvest.....	do.....	Sept. 11	11,761	Ohio Junior.....	do.....	do.....	13,213
White Mammoth.....	do.....	do.....	12,051	Early Michigan.....	do.....	do.....	10,456
Burpee Early.....	do.....	do.....	13,358	Lincoln.....	do.....	do.....	7,695
Banner.....	do.....	do.....	10,164	Hamilton.....	do.....	Sept. 11	11,035
Red River White Ohio.....	do.....	do.....	8,712	White Beauty.....	do.....	Sept. 22	12,051
Virginia.....	June 10	do.....	7,260	Extra Early Pioneer.....	do.....	do.....	14,955
Vornhem.....	do.....	Sept. 22	10,164	Eureka.....	June 1	Sept. 18	18,004
Carman No. 3.....	do.....	do.....	13,358	Early Ohio.....	do.....	Sept. 19	14,810
Irish Cobbler.....	do.....	do.....	18,876	Gold Coin.....	do.....	Sept. 20	17,424
Extra Early Tri- umph.....	do.....	do.....	15,826				

Three acres of Eureka, Early Ohio, and Gold Coin averaged 6 tons per acre over the field on second year unfertilized ground. Allowing one-sixth for loss in sorting and grading, this would leave 5 tons of marketable potatoes per acre, which were worth 6 cents a pound at digging time this year, or \$600 per acre. These same 3 acres produced 3 tons of marketable potatoes per acre last year, which were sold in March at 9 cents a pound, bringing over \$500 an acre on the first breaking. A heavy stand of timber had been cut from this ground two years before it was cleared of the stumps. A careful estimate of the cost of clearing and putting the land in fit condition for the first planting indicates it did not exceed \$200 per acre. In estimating the cost of the two crops, allowing 6 cents a pound for seed and \$7.50 a day for labor, it will not exceed these figures, which include the cost of clearing.

Expense of clearing land and raising the first two crops of potatoes.

	Per acre.
Clearing and breaking.....	\$200
Plowing and cultivating.....	50
Seed.....	90
Planting.....	20
Digging and sacking.....	140
Total	500



FIG. 1.—SUPERINTENDENT'S HOUSE AND PROPAGATING HOUSE.



FIG. 2.—STATION BARN.

STATION BUILDINGS AT FAIRBANKS.



FIG. 1.—STATION GREENHOUSE, FAIRBANKS.



FIG. 2.—CUCUMBERS AND TOMATOES, FAIRBANKS STATION.



FIG. 1.—OATS CUT FOR HAY, FAIRBANKS STATION.



FIG. 2.—FIRST SELF-BINDER IN ALASKA CUTTING OATS AT FAIRBANKS STATION.

It will be noticed that this cost is exactly recovered from the sale of the first crop, leaving the whole of the second crop as a profit, which was worth \$600 per acre at digging time, making a return of \$300 an acre per year, over and above the clearing, for the first two crops, and in addition to this a ton of culls each year, which was worth something for feed.

It goes without saying that the above yields can be more than doubled by using fertilizers liberally.

Prospective settlers should be warned that the markets are somewhat limited and should be carefully investigated with regard to supply and demand before incurring any great expense. It is thought safe to say, however, that about 20 homesteaders are now growing potatoes in the vicinity of Fairbanks, producing probably 3,000 crates, or less than 25 per cent of the amount consumed annually.

The station potato crop this year aggregated 30 tons, which will probably lose one-sixth in sorting and grading. This will still leave 25 tons of marketable potatoes, which should sell for 5 cents or 6 cents a pound toward the latter part of the winter.

Other root crops and also cabbage have made enormous profits when figured into acres, but the several market-garden and greenhouse men about Fairbanks often find it difficult to sell all they raise of such crops. The root crops, such as turnips, rutabagas, carrots, etc., usually sell at 10 cents a pound, while cabbage ranges from 10 cents to 20 cents a pound. One gardener claims to have sold 16 tons of cabbage from a half acre in 1910.

A very limited amount of green tomatoes are in demand every fall at 25 cents a pound. These, with care, can be grown in the open garden, by starting the plants under glass and covering the vines with an awning of some kind when there is danger of frost.

FORAGE.

The feed question is the one perplexing problem to the early settler in the interior of Alaska.

On account of the thick growth of timber and heavy blanket of moss, clearing and reclaiming the land is very slow and expensive.

Imported feed (hay and oats) usually sells in Fairbanks at \$90 and upward a ton. The writer challenges the many reports that are continually appearing in eastern papers, magazines, and other current literature, calling the public attention to the supposed vast areas of meadow lands in the Tanana Valley, which are calling forth innumerable letters of inquiry.

It is true that travelers often see small meadows and short stretches of good grazing, but when we consider the great area comprised in the Tanana Valley we lose sight of the few scattering grass spots. There are probably not a dozen of the 200 or more homesteaders in

the valley who can cut enough wild hay on their homesteads to winter a team. Nearly all homesteads, however, do afford some grazing for four or five months in the year.

Considerable grazing land may be found near the headwaters of the Tanana and also occasionally small areas are found on the hills above timber line. Where forest fires have devastated the timber, grass usually springs up in abundance until choked out by a new growth of timber and moss.

While a few of the more prosperous settlers have cleared up enough land to raise their own feed and some to sell, the great majority of homesteaders do not have any stock at all, but hire their neighbors to plow up a small area, and they finish the cultivation by hand, while others devote their whole time to cutting wood for a living.

FARMING FOR PROFIT.

Advancement may seem slow, but under present conditions it is possible to make farming pay in Alaska. The greatest drawback to a speedy settling of the country is the limited home market and exorbitant transportation rates.

It is estimated that the Fairbanks camp alone pays out \$100,000 annually for potatoes, one-half of which sum goes to the transportation companies. This one industry would give 100 farmers each \$1,000 a year at present prices, and much of the money would remain in the country for further improvement. The present prices, however, will not always prevail, but it is safe to say that potatoes will seldom fall below 5 cents a pound while the native product is insufficient for the home consumption, and, with a liberal application of fertilizers, 10 tons to the acre can easily be produced, which would mean \$1,000 an acre.

The hay crop is becoming another source of revenue to the more prosperous farmers and it should be only a matter of time when the settlers will supply the market with oat and barley hay to take the place of the 1,000 tons of timothy hay now shipped annually from Seattle.

It will be many years before the farmer can attempt to supply the grain trade, for he can better afford to sell his grain in the straw. Grain hay usually sells for \$50 to \$60 a ton and but very little has as yet been offered for sale.

Such land as has been referred to elsewhere in this report under the heading of "Potato culture" (p. 47) will produce 2 or 3 tons of oat hay per acre without using fertilizers (Pl. XI, fig. 1). Poorer lands will do as well if properly fertilized or summer-fallowed and well cultivated. By poorer land is meant rolling land of northern exposure and brush land or land which does not have the heavy growth of timber that has been recommended in the choice of land for potato culture.

Some farmers are attempting to raise hogs on rather an extensive scale, but it is doubtful whether it will prove profitable, especially while the farm products find a ready market at high prices. However, if the farmer will raise a considerable area of root crops and build large frost-proof cellars in which to store the crop for winter feed, he may make the hog business pay. Porkers sell at 35 cents to 40 cents a pound. Hogs have to be housed and protected from the cold by artificial heat.

Poultry is another source of considerable profit when properly managed. It is estimated that 6,000 cases of eggs are shipped annually from Seattle to Fairbanks, and 25 per cent of these are hauled in over the ice in winter at great expense. During the winter months eggs retail at \$1 to \$2 a dozen, while the few local ranch eggs are usually about \$1 higher.

GRASSES.

Nothing has been done in the culture of grasses during the last year, except the seeding of 5 acres of timothy on a rather flat southern exposure. The tract was seeded thickly on June 23 with a seed drill to insure a quick and even stand. The timothy soon covered the ground. It made from 6 to 10 inches growth, and much of it headed.

A patch of timothy seeded with winter grains in August, 1910, made a fair start and lived through the winter. It matured seed in August on stems 2 to 3 feet tall but too scattered to cut.

Volunteer red clover found about the garden and potato patch made large plants, blooming in July.

GRAINS.

The possibility of maturing early varieties of oats, barley, and fall grains has been proven beyond further question. All fall seedings of wheat and rye, if well protected by snow during the coldest weather here, matured every year since the station was started. The wheat, however, is sometimes partly killed by the winter, making the crop very thin.

Rye stands the winter better than wheat and seldom fails to make a good crop. Fall grains should be seeded very early in August and the grain usually matures from August 10 to 15 of the following year.

The ripening of spring grains depends largely on the earliness of seeding. The seed should be in the ground not later than May 20, however. The earliest varieties will usually mature from seedings as late as June 1, and often even later seeding will mature, depending, of course, on the lateness of the fall.

As mentioned elsewhere in this report, the variety test plat work has been discontinued for the present, but a few leading varieties

of wheat, oats, and barley were selected and seeded in plats 30 by 30 feet on May 30. The grain was drilled by hand in light furrows made with a wheel hoe cultivator and covered with a garden rake. The soil was south slope birch land, planted to potatoes last year on the first breaking. These grains all came up very quickly and made a rank growth, so rank that the light rains caused the straw to start falling before it had fully headed. By the time the grain had formed, every plat was laid as flat as if a roller had been drawn across it. This certainly retarded the ripening of the grain, nevertheless four varieties of barley, viz, Hannah No. 5793, Manchuria, Beardless No. 19852, Hull-less No. 19851, and as many of oats, Banner, Sixty Day, South Dakota No. 637, and Finnish Black, all matured good seed. Three varieties of spring wheat and one of spring rye all filled well, but the grain had not fully ripened before the killing frost of August 31. The Romanow and Red Fife varieties of wheat were farthest advanced and would have made seed if it had been cut and covered before the killing frost.

A half-acre tract of south slope birch land was seeded to North Finnish oats on May 16. The ground was yet very wet, but on account of an urgent request from the special agent to mature seed of this variety, if possible, the ground was disked on May 15 and again on the following day, when the seed was sown. Disking and harrowing continued at intervals for three or four days after seeding. This frequent stirring of the soil caused it to dry out to a fair state of cultivation. It should be said that this new ground was broken the summer before. The grain was up by May 26 and headed by July 4. It was thoroughly ripe and harvested August 11, the earliest to ripen of any known spring seeding in the valley. Portions of the crop lodged, but the growth was not so rank as that on the smaller plats succeeding potatoes.

One acre of Banner oats, seeded June 1, on high land sloping slightly to the north, matured and was cut for seed with the new self-binder (Pl. XI, fig. 2). This ground had potatoes on it last year. The potatoes were frosted early in the summer, but the cultivating greatly improved the grain crop that followed, as was evidenced by over a ton and a half of fodder, while adjoining ground, summer-fallowed and not cultivated, produced only a ton to the acre.

Kharkov winter wheat and two fall ryes, seeded August 5, 1910, matured perfectly by August 10. The stand was quite thin, the grain having partly been killed by winter.

THE HAY CROP.

As has been stated in former reports, the hay crop is much improved by summer-fallowing and frequent cultivating through the summer. The ordinary land will not stand cropping every year without using some fertilizer.

Early seeding is highly important, as it is next to impossible to cure hay cut after the first week in September.

If it can be cut about August 15 or 20 there will not be much difficulty in getting it cured and stacked. One acre of oats was cut quite green on September 1 with the self-binder and the sheaves set up two and three in a place. This went through several rains and yet cured out well and made good hay, while grain cut with the mower the same day, and also some cut a few days earlier, lay on the ground 10 days before it could be shocked, and some shocked a little earlier had to be scattered two or three times to get it fit for the mow. Some large shocks of sheaves cut about August 23 with the binder cured out well in the shock, standing through several rains.

The hay crop this year amounted to about 25 tons from 30 acres, but several acres of this have been cropped annually for three years, which resulted in a very light yield.

In conclusion, the farmer who will resort to summer-fallowing his land and will fertilize it liberally will find farming in Alaska both a pleasure and a profit.

REPORT OF WORK AT KODIAK LIVE-STOCK AND BREEDING STATION.

By M. D. SNODGRASS, *Superintendent.*

Work at Kodiak Station has been more satisfactorily carried on during the past year than in previous years, due to better and more equipment and to more efficient help. The need of more shelter and equipment grows as the herds increase, and it will be a number of years, at the present allowance, before the station is fully equipped for accurate experimental work.

It was found advisable to postpone the dairy work another year in order to make necessary improvements in the dairy barn and build an addition to the dairy building. A new 100-ton silo was purchased for the dairy work at Kodiak and will be erected this fall and winter. Cement floors and steel stanchions for the dairy barn will be put in before June 1, at which time it is planned to begin the dairy practice. Fencing at Kodiak was resumed in the spring, and calf pastures and night pastures for the cows were inclosed. At Kalsin (formerly called Calsinsky) Bay the work of fencing was resumed in the early spring, and the 20-acre meadow fenced last year was made sheep tight and converted into a sheep pasture for lambing time.

Road work was continued during the winter and spring at odd times and whenever possible. Some needed short cuts were made, and culverts and pole bridges were put in temporarily to aid in haul-

ing this year's hay crop to the barn. These bridges will be replaced by stronger and permanent bridges as soon as it is possible to do so.

The work of clearing meadow land was resumed in the early spring and continued up to the time to begin cutting hay this season. Ten acres of beach land was cleared of logs and driftwood. Seven acres of this land was cleared last year, but the extreme high tide of last November, accompanied by a heavy northeast gale, deposited an enormous amount of drift logs and wood on the beach. About 15 acres of tide flat was cleared of driftwood. About 60 acres of new meadow land was added to that cut over last year, making a total of 215 acres of land which can be cut over with the mowing machine. The practice of cutting the hay off every other year can now be followed, and thereby hold up the yield of hay. It is found that by continual cutting of the hay year after year the yield lessens noticeably after the second year. Unless manure is added to keep up the yield, it is necessary to let the hay stand every other year. Then, by burning the grass in the spring a good yield of hay can be had. The burning of the grass aids in three ways: (1) It leaves the ashes on the ground to be soaked into the soil by the frequent rains of the spring; (2) it allows the ground to warm up much earlier than it would if the old grass remained on the ground as a blanket to hold the frost; and (3) it destroys the moss more quickly than any other method possible in Alaska. About 2 acres of beach land was broken up last fall and disked this spring after a heavy dressing of manure was spread upon it, and was then seeded to oats for hay. A slight mixture of barley in the oats made it possible to test barley growing also. The oats made a good stand and grew rapidly after July 15. They headed out late in August at about 18 inches in height. The barley mixed in the oats stood about the same height and headed a week earlier than the oats. The oats came into the milk stage, and some of the earlier heads matured sufficiently to be used for seed, while the barley all ripened nicely. The oats were cut for hay October 1 without being damaged by frost. The yield was estimated at 1 ton per acre. At Kodiak, on clay loam soil that had been seeded to oats for two years past, the oats were seeded June 19 without manure on the land this season. The growth was slow until late in July. On August 8 the oats were from 6 to 8 inches high, of fairly even growth and a good stand. They began heading late in August and were fully headed September 15 at 28 inches in height. These oats were nearing the milk stage October 1 and were left standing until they froze, to determine what frost they would withstand. It is estimated that these oats yielded 2 tons of hay per acre.

A third wagon was purchased this season; also a new mower and rake. This new equipment greatly aided in putting up the hay and silage this year. The new mower, especially, came in to good ad-

vantage about the middle of the haying season, when both the old mowers were broken so badly as to render them worthless for the rest of this season and until repairs could be had from Seattle.

The 3-year-old colts were broken in to work during the spring and made an excellent team for haying before the season was over. They have made very good growth during the past year and will make 1,000-pound horses. The 3-year-old mare was in foal when purchased last year and dropped a horse colt in April. The colt made good growth this summer and will make a medium-size horse.

The box lighter used in towing stock and hay between Kalsin Bay and Kodiak was lost in a storm last October 13. The lighter was washed ashore in a storm and broken up on the beach. This made the transfer of stock between the two stations impossible during the winter months. The cattle pastured at Kodiak last summer were driven overland to the bay, starting from Kodiak November 1 and reaching Kalsin Bay at noon on November 4.

During the winter knees were cut from native timber for a large skiff to take the place of the lighter, and lumber for the skiff was purchased at Petersburg, Alaska, but owing to the lack of boat carpenters here this summer it has been impossible to get the skiff built. The materials have been well seasoned and kept dry during the summer and the skiff will be built this fall. Through the kindness of Mr. P. D. Blodgett, of Kodiak, the station has had the use of a large skiff for transferring teams and farm machinery between Kodiak and Kalsin Bay. The trip from Kodiak to the bay, by means of launch and skiff, can be made in $3\frac{1}{2}$ hours while by the overland route it takes 2 to 3 days to make the trip.

The need of a new launch—one that will be more seaworthy, and schooner rigged—is keenly felt every time we are caught in a rough sea. The allowance of \$1,000 by the department for a launch made it necessary to get along with a second-hand hull. A suitable gas engine for our work here could not be bought for less than \$700, and this left about \$300 for a hull. The cost of building a hull suitable for the engine and large enough for our purpose would be about \$1,000. Such a launch would be seaworthy and safe.

A sheep barn, or rather an addition to the horse barn, is under construction for the use of sheep. This addition is 60 feet long and 20 feet wide. It is barely large enough to shelter the flock this winter and will have to be enlarged another year to accommodate the increase of the flock next season.

CLIMATIC CONDITIONS.

The fall of 1910 was about the average for several years past in precipitation and snowfall. The snow did not lie on the ground for more than 48 hours at a time, until December 13, and after that

for only a few days at a time, until after March 30, when the heaviest snowfall of the year came and lay on the ground until May 1. There was considerably more sunshine than usual and westerly winds prevailed during the fall, and, in fact, the whole winter. The winter was not so cold as the previous winter and at no time did the thermometer register below that of the previous year, yet a little above normal, while the precipitation was less than normal by 10 inches. The ground was frozen deeper than it has been known to freeze for many years, owing to the fact that the ground was bare so much of the winter. The deep freezing of the ground and the late snowfall covering the ground made the spring of 1911 fully two weeks later than last year and nearly a month later than usual. The frost was not out of the ground sufficiently for plowing until about June 1, and grass was very slow in coming, even where the tidewater took the frost out of the ground early in April.

Summary of weather record at Kodiak from October 1, 1910, to September 30, 1911.

Month.	Temperature.			Precipitation.		Character of weather.			
	Maximum.	Minimum.	Mean.	Total.	Snow-fall.	Clear.	Partly cloudy.	Cloudy.	Rain or snow.
October.....	53	17	38.3	8.18	2	1	25	5	20
November.....	47	13	34.5	5.38	2	5	15	10	15
December.....	44	9	27.3	6.73	18.5	6	17	8	13
January.....	45	9	28.8	2.00	3	9	19	3	5
February.....	46	8	29.4	2.98	8	3	17	8	13
March.....	44	2	29.6	3.24	38	6	19	6	10
April.....	51	17	30.8	4.44	12.5	2	17	11	16
May.....	58	22	40.1	3.01	3	2	26	3	13
June.....	74	34	45.7	7.57	Trace...	3	16	11	15
July.....	76	35	52.4	1.78	-----	3	23	5	12
August.....	82	35	57.1	3.53	-----	3	22	6	10
September.....	63	35	49.8	2.77	-----	2	23	5	11
Total.....				51.61	87	45	239	81	153

By reviewing the weather records by months for the year a fair idea of climatic conditions prevailing at Kodiak may be obtained. October, 1910, was a fairly wet month, the precipitation being 8.18 inches, with only 2 inches of snow. There was but 1 clear day and there were 5 cloudy days and 25 partly cloudy days. The rains came mostly at nighttime and gave us good weather during the day. The prevailing winds were from the west, with very heavy gales for 3 days. November gave the average precipitation and but 2 inches of snow. There were 5 clear days, 10 cloudy, and 15 partly cloudy. The prevailing wind was from the northwest, with two heavy gales on November 7 and 8. There was more wind during the month than usual, making travel by water uncertain and dangerous. December weather was similar to that of November, on the whole, with the exception of more snow, there being 18.5 inches. There were 6 clear days, 8 cloudy, and 17 partly cloudy. The forepart of the month was

dry and windy. Four heavy gales occurred during the month. The last half of the month was wet. Snow covered the ground for the last 7 days. January was exceptionally clear and windy and dry. There were but 3 inches of snow during the month and that went off within 5 days, leaving the ground bare for 25 days during the month. For 12 days heavy gales of wind from the west and northeast made it impossible to travel by water, and wound up with a terrific wind-storm on January 29. There were 9 clear days and but 3 cloudy days and 19 partly cloudy days. February weather was about the average for that month for the past several years; 3 clear days and 8 cloudy with 17 partly cloudy; 8 inches of snow fell during the month but went off very quickly. The ground was bare for 20 days in February. There was not so much wind as in the preceding months and only one heavy gale for the month. The first half of March was similar to February; very little snow and quite windy, while during the latter half of the month the heaviest snowfall of the winter was recorded. From March 20 to 23 the snowfall was 29 inches, and this snow lay on the ground until the last of April. The total snowfall for the month was 38 inches; nearly double the average for the month for several years past. There were 6 clear days, 6 cloudy days, and 19 partly cloudy. The first half of April was comparatively sunshiny, with little snow and with the usual windy weather, while the latter half was wet. Snows and rain were frequent. The snow on the lowlands was nearly all melted by the last of the month, except the deep drifts in the woods and canyons in the foothills of the mountains. The mountains were covered with snow until late in June. The snowfall for the month was 12.5 inches. There were but 2 clear days, 11 cloudy, and 17 partly cloudy days. May was comparatively dry with abundant sunshine. There were two light snowstorms, one on the 1st and the other on the 15th, but the snow went off soon after it fell. The frost was very slow in going out of the ground and grass did not start to grow except on the tide flats. There were 2 clear days and but 3 cloudy days, and 26 partly cloudy days. June was wet and cold on the whole, with but 3 clear days, 11 cloudy, and 16 partly cloudy days. Grass grew very slowly until the last week in June, and after that it grew rapidly, making good upland pasture by July 1. July was very dry and warm. The precipitation for the month was only 1.78 inches. There were 3 clear days and 5 cloudy, with 23 partly cloudy days, the greater part of each day being bright sunshine. August was much warmer than the average for that month for many years past. The precipitation was 3.53 inches. There were 3 clear days and 6 cloudy, with 22 partly cloudy days. September was dry and warm. The precipitation was but 2.77 inches. There were 2 clear days, 5 cloudy days, and 23 partly cloudy days. There was more wind than usual for September, but on the

whole the weather was fair. There were no killing frosts in September. Grass and grain crops were still growing or maturing, as the case might be. On the whole the season was too dry for a good yield of either hay or vegetables.

Summary of weather at Kodiak from October 1, 1907, to September 30, 1911.

Month.	Clear days.				Partly cloudy days.				Cloudy days.			
	1907-8	1908-9	1909-10	1910-11	1907-8	1908-9	1909-10	1910-11	1907-8	1908-9	1909-10	1910-11
October.....	6	7	6	1	7	11	16	25	18	13	9	5
November.....	10	1	9	5	-----	11	17	15	20	18	4	10
December.....	7	5	1	6	2	18	20	17	22	8	10	8
January.....	7	5	4	9	15	19	19	19	9	7	8	3
February.....	10	2	-----	3	11	20	21	17	8	6	7	8
March.....	6	1	-----	6	10	21	23	19	15	9	8	6
Total for six months.....	46	21	20	30	45	100	116	112	92	61	46	40
April.....	2	1	2	18	24	21	17	14	4	8	11	11
May.....	1	3	3	2	16	23	18	26	14	5	10	3
June.....	5	3	2	3	15	19	21	16	10	8	7	11
July.....	1	9	3	12	23	13	23	19	7	9	5	5
August.....	7	8	5	3	13	13	20	22	11	10	6	6
September.....	3	8	4	2	20	11	18	23	7	11	8	5
Total for six months.....	16	25	24	15	92	113	111	127	75	45	48	41
Total for the year.....	62	46	44	45	137	213	227	239	167	106	94	81

Month.	Days on which rain or snow fell.				Precipitation and snowfall.							
	1907-8	1908-9	1909-10	1910-11	1907-8		1908-9		1909-10		1910-11	
					Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.
October.....	15	13	14	20	In.	In.	In.	In.	In.	In.	In.	In.
November.....	15	20	5	15	7.70	4.5	14.11	2.5	1.42	2.5	5.38	2.0
December.....	13	14	13	13	6.50	5.5	7.15	11.0	5.47	5.5	6.73	18.5
January.....	16	9	8	5	4.57	6.5	1.33	15.0	2.68	14.5	2.00	3.0
February.....	15	12	13	13	5.65	11.5	1.53	12.5	5.36	20.0	2.98	8.0
March.....	15	18	21	10	2.91	8.5	3.92	37.0	4.90	24.0	3.24	38.0
Total for six months.....	89	86	74	76	36.03	37.5	34.95	79.0	24.28	68.5	28.51	71.5
April.....	17	11	16	16	4.87	17.5	5.41	4.0	7.40	34.5	4.44	12.5
May.....	27	16	13	13	6.05	-----	4.97	.5	4.54	3.0	3.01	3.0
June.....	9	16	16	15	1.63	-----	7.25	-----	3.68	-----	7.57	Trace.
July.....	21	13	12	12	6.64	-----	2.92	-----	5.23	-----	1.78	-----
August.....	16	17	10	10	7.04	-----	5.12	-----	-----	-----	3.53	-----
September.....	15	15	14	11	3.82	1.0	4.64	.5	3.62	-----	2.77	-----
Total for six months.....	105	88	81	77	30.05	18.5	30.31	5.0	24.47	37.5	23.10	15.5
Total for the year.....	194	174	155	153	66.08	56.0	65.26	84.0	48.75	106.0	51.61	87.0

Comparing the fall and winter months with those of the past three years it is found that there were more clear days than the average for that period of the year and considerably more days recorded as partly cloudy than the average, while the cloudy days were 26 less than the average for the three years. Comparatively, the

weather was much clearer than that of the past three fall and winter months. The number of clear days for the spring and summer months was below the average, while the partly cloudy days numbered considerably above the average. The number of cloudy days was 15 less than the average. By comparing the records in the table on page 58 it will be seen that the total number of days of sunshine for the year is larger than for the past three years, and that the precipitation is less, thereby coming more nearly to ideal conditions for agricultural pursuits.

The spring was the latest on record, due to the deep freezing of the ground during the winter, but the summer was the warmest experienced for many years. While the spring was very late, the actual growing period was fully as long as usual. The dry weather shortened the hay crop fully one-third. Potatoes grown by the natives and settlers gave but a fair yield. Garden vegetables made good growth and were of very good quality.

HAYMAKING AND PUTTING UP SILAGE.

The very late spring made the haying season much later than usual, and the dry weather of July and August shortened the crop fully one-third on the land that had never been cut over before and one-half on meadows cut the previous year. Beach grass was much shorter than in former years. On ground cut over in former years the yield was less than half that of previous crops. The grass was slow in starting, but grew fast the last week of June and until July 20, when the dry weather began to affect its growth. The first hay was cut on July 29. This would yield about three-fourths of a ton per acre, and was still growing. It was thought advisable to cut as much hay as possible before it headed and became woody and coarse. The grass was showing the first few heads when the cutting was begun. A light shower of rain fell on July 31, and from that date until August 18 the weather was ideal for haymaking. The days were partly cloudy, but each day the sun shone the greater part of the day and a southwest wind prevailed the whole period. The hay first cut required seven days to cure sufficiently for stacking, while that cut a month later cured in four days and that cut still two weeks later cured in two or three days. The early cutting made very light, fine hay, but the keeping qualities in the stack are not to be compared with that cut when the hay was more nearly mature. It sweats much sooner than the later cutting and is more apt to "stack burn." After sweating in the stack it is very dusty and is apt to cause heaves in horses, unless fed with the utmost precaution. All this can be avoided by curing it thoroughly before it is stacked. By using a liberal amount of salt when stacking the dust is not so bad and the hay comes out brighter.

From August 18 to 24 rainy weather made it impossible to work with hay. During the wet weather, when fit to work in the field, silage was cut and hauled directly to the silo. As soon as the weather cleared work at haying was resumed. Hay that was nearly cured and in the field during the week's wet spell was spoiled, while that cut two days before the rain was not damaged to any great extent. Two mowers were kept running the greater part of the early period of cutting hay and the work was rushed while the good weather lasted. Stacking in the field was practiced this season, owing to the long hauling necessary to get the hay to the barns. Each night three wagonloads were hauled to the barn and stored under shelter. The two old mowers were broken and out of commission about September 1, and from that date only one mower was used. From August 25 until September 4 we had good haying weather, and after a week of showery weather, until the last of the month, there were only a few very light showers, affording ample time to get up all the hay needed for winter feed.

Over 100 tons of dry hay were put up this season, 40 tons of which were hauled to the barn and over 60 tons stacked in the field. (Pl. XII, figs. 1 and 2.) That stacked in the field will be hauled to the barn this fall and early winter, as there is room for it. During the haying season about 20 tons of hay were spoiled and lost on account of rains.

Silage was cut during all wet weather from the first of August through the haying period and until early in October. When it was too wet to work dry hay in the mornings one team was kept hauling silage from the fields to a large skiff anchored on the tide flats, or, if near enough, it was hauled to the silo. Much of the silage was cut a mile or more from the barns and loaded into the skiff, holding 9 or 10 tons, and this was towed with the launch at high tides from the mouth of the river across the bay and beached near the silos. By working with the tides the skiff was loaded when the tides were out, and it was possible to drive alongside and unload in the same manner. By the use of the skiff the long hauling with the teams was avoided and much time was saved, even though it required double handling. None of the pitching at the skiff was high and the double handling required less than half the time necessary to haul from the tide flats with teams.

One hundred and seventy tons of silage were put up this season. All the silage was pitched by hand into the silos. The old silo, which is 16 feet high, is set in the ground 2 feet and a raised driveway is built opposite the door in the roof, so as to make it possible to pitch the silage from the wagon into the silo. The new silo is 26 feet high and requires a staging and platform from which the upper part must be filled. This silo has doors from the ground up and the doors are

put in place as the silo is filled. The silos are filled with the beach grass and blue top as cut and kept full as it settles. A silo holding 100 tons will be about full when 50 tons are put into it, without allowing time for settling. Within a week's time the silo will take 15 or 20 more tons, and by filling it up every four or five days until it settles no more it will hold 100 tons. It takes from 6 to 8 weeks to fill the silo until there is no more settling. The settling is more rapid after the fermentation begins, and as the temperature of the silage increases the settling is more noticeable. The higher the silo the greater the pressure and the more rapid the settling and the better the silage. The ideal condition for curing the silage is obtained where the pressure is great and all air space within the silage is reduced to a minimum. To secure ideal conditions it is necessary to cut into short lengths the material used for silage. This not only allows closer packing of the material in the silo, but aids in the rapid fermentation of the silage and makes it more uniform in appearance and quality. It also makes the handling of the silage much easier when feeding to animals.

About 25 tons of native blue top were put up for silage this year in order to test its value. This grass is more bulky than beach grass and will not pack so well, but it was put in the silo near the bottom and subjected to the heavy weight of 50 or more tons of beach grass above it. Blue top has been used for silage at the C. H. Frye ranch near Kodiak for several years past and is reported as being very good silage. The writer has never visited this ranch when the blue-top silage was being fed and therefore can not speak from observation or experience. If the blue top was put through an ensilage cutter, so as to thoroughly pack it and exclude the air, its value as silage would be greatly increased. The grass commonly called "red top" is properly named "blue top" to distinguish it from the genuine red top.

THE STATION HERD.

The Galloway herd at this station made a good increase this year and in every way the herd has proven its adaptability for this country. Twenty-eight pure-bred calves were dropped since last report, half of which were heifers. The losses for the year were one bull calf drowned and one 6-year-old bull died of pneumonia.

The cattle at Kodiak village lived on pasture alone in the fall of 1910 until November 8, and from that date they were fed hay at nighttime and kept in the barn. During the day they pastured in the woods. They held up in flesh well until late in December, when it became necessary to feed hay during the daytime. The cattle browsed in the woods almost every day during the winter and until March 20, at which time the snowfall was so great as to make it

impossible for them to get about in the woods. From that date until the grass came the cattle were fed hay and silage.

At Kalsin Bay, where the main herd was wintered, the cattle were allowed to pasture on the beach land, where they got sufficient feed to keep them in flesh until late in November, when they were fed about half a ration of hay until December 11, and from that date until the middle of April the cattle were fed a full ration of silage in the morning and hay at night. At all times during the winter the cattle were allowed to run at large after feeding in the morning. They were fed in the cattle barn during the stormy weather, or when there was any mud, and out of doors in the pasture when the ground was frozen or snow covered the ground. When feeding indoors, the calves were separated from the main herd, as were the yearlings and 2-year-olds, and each lot fed separately. This insured the young stock an equal chance at their feed. The amount of silage and hay fed can only be approximated, as none of it could be weighed accurately. The only means of weighing the feed was by means of a small platform scales. The silage and hay fed in one day's ration was weighed from time to time, so as to get a general average of the amount fed. It was the practice to feed such an amount as to satisfy the cattle and not allow waste. A small rack was built to set on the scales platform for weighing silage, while it was necessary to weigh the hay by the forkful, as carried by a man and placed in the mangers. The grown cattle were fed from 30 to 40 pounds of silage and from 20 to 25 pounds of hay per head per day. The 2-year-olds ate from 25 to 30 pounds of silage and from 15 to 20 pounds of hay. Yearlings ate a few pounds less than the 2-year-olds, and the calves ate from 10 to 15 pounds of silage and about 10 pounds of hay. This ration was fed throughout the winter and until late in April, when the cattle began to get beach grass on the tide flats. Then the ration was gradually lessened, and after May 9 the cattle were able to get their living from the new grass on the tide flats. They were pastured there until June 23, when they were turned out to upland pasture. There was but little snow covering the ground, and then only for a few days at a time, until after March 20. This gave the cattle better opportunity for browsing during the winter than they have had for two winters past. The calves made fair growth throughout the winter and came to grass in good, thrifty condition. The young stock all made fair growth and the herd as a whole was in better condition when turned out to grass than in previous years. A few of the cows that suckled late fall calves fared the worst of any and were thin before grass came; also two young cows that calved early in April. With these it was necessary to feed a little grain ration for a few weeks. A few of the late fall calves were fed a little bran,

middlings, and cracked corn for about three months. One pound of grain feed per head was all that the calves received.

The cattle made rapid gains on pasture after July 1 and were fat enough for beef August 1. The young calves made rapid growth and are in the best of condition and are still with the cows. The early spring calves are ready to wean, while the summer and fall calves will be allowed to run with the cows until they are about 6 months old.

Two yearling bulls have been sold to settlers for breeding purposes since last report. One was sold to Peter Ponchene, Unga, Alaska, and the other to W. McAlpine, Homer, Alaska. Two bulls and three steers have been butchered and sold for beef, and there are still a number to be butchered this fall. Five of the best bull calves of those dropped this year have been saved for sale for breeding purposes and a few heifers and cows are for sale to settlers wanting Galloways for beef cattle. The better milkers of the herd will not be put on the market for several years to come, as it is planned to begin the dairy work the first of next June. It is also the plan of this station to purchase 8 or 10 head of the best Galloway milkers to be found in the States this coming spring. From the best cows now in the herd and those we hope to get from the States, we expect to evolve the dual-purpose Galloway cow. This work will take a number of years to carry through to completion and will necessitate the utmost care in mating, feeding, and handling of the cattle.

THE HANDLING OF SHEEP.

The grade ewes purchased by this station last year and the lambs dropped last year give promise to be of economic value to this section of Alaska. Two rams were purchased at North Yakima, Wash., last fall, one Lincoln and one Cotswold. These were the best that could be found. Both stood the trip from Seattle very well and have thriven well in this country. The Lincoln ram was put at the head of the flock and the Cotswold reserved for future service.

The sheep were allowed to range the mountain sides near the station during the fall and early winter months. As there was little snow in the early winter months, the sheep preferred the mountains to the lowlands.

The presence of bears in the vicinity of where the sheep pastured in the late fall caused the men at the station considerable uneasiness for the safety of the sheep, and they tried to round up the sheep each week, but never got an accurate count of the flock until December 11. Thirty-two head of sheep were driven from the mountains to the barnyard and kept confined thereafter, and 26 head were counted that day along the mountain sides where it was impossible for a man to get at them. Later these 26 head of sheep came down

to where they could be driven to the yard. The last three head of these came down about the middle of February and were fat enough for mutton. Of the 13 missing sheep, the remains of 4 lambs were found, 3 of which had been eaten by bears on the mountain side. The bones that were left showed plainly that bears had eaten the lambs. One lamb died or was killed by some animal not able to crush the bones when eating it. Careful search over the mountains during the winter and again this spring gave no signs of the missing sheep, and we have come to the conclusion that the sheep must have been killed by bears.

The sheep brought to the yards on December 11 were in prime condition and strong and rugged. The lambs were nearly as large as the old ewes. They were put on hay rations for a few weeks and were then fed as much silage and hay as they would clean up. They were put in the shed at night and on stormy days and were kept in the yard during the day in good weather. The sheep wintered well on the hay and silage and were in thrifty condition in the spring. They were allowed free range in the spring as soon as the snow went off. In this a mistake was made. The sheep were hungry for a change of feed and ate of the old dead beach grass until they got their fill and thereby three ewes died of impaction. The sheep gained flesh rapidly when grass came. Of the original 40 ewes purchased last year, 35 were left at lambing time this year. One became entangled in brush and died, three died of impaction, and one was missing, supposedly killed by a bear. Of the 30 lambs on hand last October, 20 escaped bears, 11 ewes and 9 wethers. These yearlings are almost fully grown. This season there were 37 lambs dropped and 31 saved. They were sired by our pure-bred Lincoln ram. The lambs were dropped in June and early July. All made good growth this year and are the thriftiest and most uniform bunch of lambs ever grown in this country. The lambs came at a time of the year when pasture for sheep was good. There was little trouble in getting the ewes to own their lambs.

The shearing was done June 20. The average weight of wool was 7 pounds, a little below that of last year, but the wool was cleaner and in better condition.

The sheep industry in this country is only at the beginning, but is attracting the attention of sheepmen in the States. One flock of 500 yearling ewes was shipped to Raspberry Island, near Kodiak, this year, by Mr. F. H. Rier, who for years past has been in charge of the Frye ranch here at Kodiak. Mr. Rier believes in the sheep industry in this country and expects to bring in another flock next year. These young ewes have taken well to the country and are in splendid condition this fall.

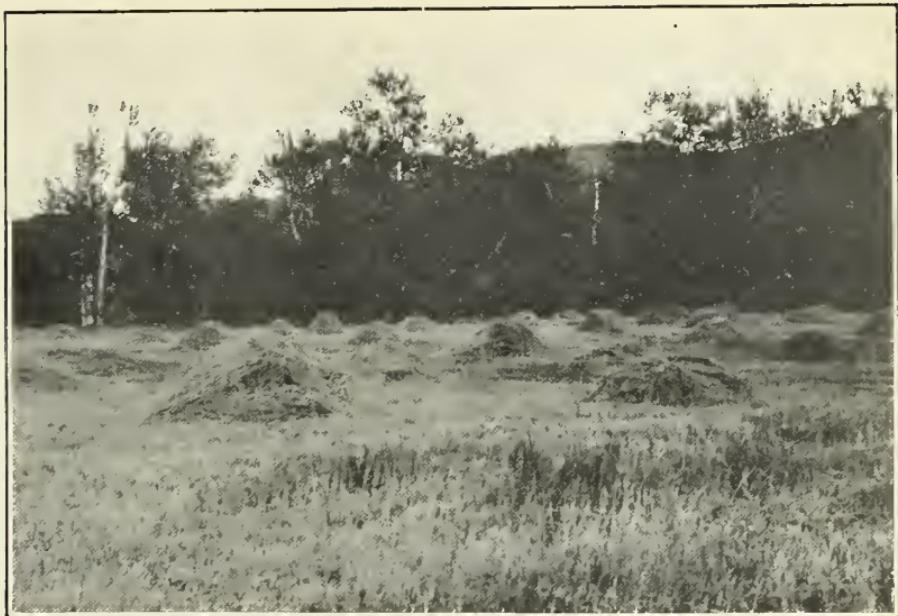


FIG. 1.—MAKING HAY FROM WILD GRASSES, KODIAK STATION.



FIG. 2.—HAULING AND STACKING WILD GRASS HAY, KODIAK STATION.



FIG. 1.—CATTLE AT PASTURE, HINKLEY'S DAIRY RANCH.

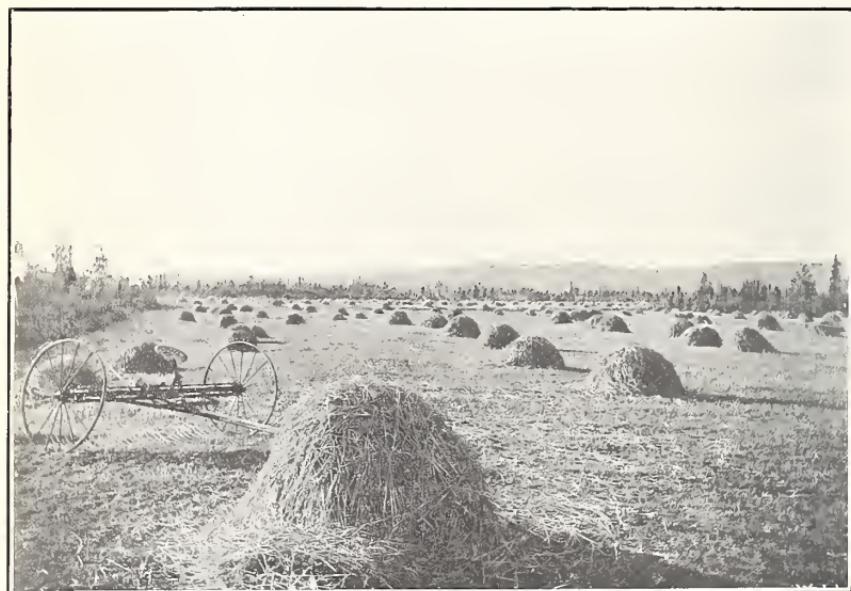


FIG. 2.—BARLEY HAY, YOUNG'S RANCH, FAIRBANKS.



FIG. 1.—JOHN CHARLEY'S MARKET GARDEN, FAIRBANKS.



FIG. 2.—HYDE'S RANCH ON TANANA RIVER, 8 MILES BELOW FAIRBANKS.

NEEDS OF THE STATION.

The needs of this station as developed this year are as follows: One new silo, a new mower and rake, a new wagon, lumber for a larger skiff, also lumber for an addition to the dairy building and a sheep shed. The most urgent needs to be met the coming year are for a larger launch, an ensilage cutter, a combination wagon and stock scales, a stationary gas engine, and a residence for the superintendent, besides an addition to the cottage at Kalsin Bay, and, most of all, another hay barn.

This has been the most successful year's operation of Kodiak Station.

REPORT FROM COPPER CENTER STATION.

Mr. L. A. Jones, United States Government teacher at Copper Center, has submitted the following report on the work of the Bureau of Education at Copper Center. It will be remembered that when the Copper Center Station was closed the land and buildings were turned over to the Bureau of Education for use in giving instruction in agriculture to the natives. Mr. Jones has been in charge for the last two years, which period is covered by his report.

Since the Government farm at this place was placed in the care of the Bureau of Education the work has been continued in a small degree as a part of the school work for the natives. In this report is included the past two growing seasons, in order that it may afford a comparison. Besides the long, cold winters of the interior, this valley has three conditions detrimental to profitable agriculture, viz, a very light, sandy soil over a coarse gravel, a short growing season, and a very small rainfall the first half of the season.

Considering the growing season from May 1 to September 15—138 days—in 1910 there were 35 clear, 67 partly cloudy, and 36 cloudy days. There was a rainfall of 2.92 inches on 23 days. During the months of May and June there was a rainfall of but 0.53 inch for germinating the seed, and a fall of 1.96 inches in July and the first 10 days of August, when killing frosts began. There has been 93 days since the last frost, on May 7. The maximum temperature was for May, 77°; June, 79°; July, 85°; and August, 80° F.

During the same season in 1911 there were 40 clear, 68 partly cloudy, and 30 cloudy days, with a rainfall of 5.87 inches on 14 days. The last frost in May was on the 22d and the first in August, on the 18th. 87 growing days. It was better for crops, as the last frost was later than usual. Slight frosts on July 9 and 12 did no damage, but the July frost in former years has often killed the potatoes. Germination was favored by the spring thaw, as the snow had fallen upon a dry frozen ground, and as the snow melted the water sank into the ground instead of being drained away. However, there was but 0.38-inch rainfall during May and June. Seeds planted late did not come up and early planting grew slowly until a copious rainfall began July 7 and extended throughout the rest of the season and crops grew rapidly until frost.

We did our seeding in 1910 from May 10 to May 20, and in 1911 about 10 days later.

CROP RESULTS.

Oat hay. In a field of about 10 acres 4 tons of hay were harvested in 1910. The ground was plowed, seeded, and harrowed. No fertilizer was used. In 1911 a crop of about 10 tons was harvested. The seed was plowed under and the ground harrowed and rolled. A very small amount of barnyard manure was used. As a result the crop stood the dry months better and a small part matured before the August frost.

Potatoes. In 1910 the crop was a failure unless one had the earliest varieties. We planted 60 pounds of seed and harvested 25 pounds. In 1911 we planted 10 pounds and harvested 40 pounds. Others with better soil did better, and one party with irrigation harvested 150 pounds on a plat 10 by 30 feet.

Peas. Extra Early and Nott Excelsior made a rapid, healthy growth, and were ready for use August 1, a fair crop of good quality. They were killed by the frost late in August.

Beets. Extra Early Egyptian, about 30 per cent germinated, of small, good quality, ready for use August 15.

Carrots. Long Orange, grew slowly during dry part of season, and later rapid growth was made until long after frost. These are small but large enough for table use September 1, but not prolific enough for feed.

Lettuce. Most all varieties did well and were ready for use from July 15 to September 20.

Parsnips. Hollow Crown in 1910 failed to germinate; in 1911 came up late with slow growth, but were large enough for use by August 25.

Turnips. Purple Top made rapid growth in 1910; only a small percentage of early sowing came up in 1911, but they were large and of good quality. Late sowings did well but were small.

Yellow Petrowski. In 1911 these were up in 10 days, ready for use July 26, and many of those harvested were more than 6 inches in diameter. There were few root-maggots.

Rutabaga. Purple Top White Globe came up well and made rapid top growth, but the roots were still small at the first freezing in October.

Cabbage. Only early varieties will head. The growth is rapid, with large leaves. In 1910 only about 15 per cent headed, with small heads of about 1 pound each. In 1911 fully 50 per cent formed heads, some weighing 3 or 4 pounds and a few even larger. They were ready for table use August 30.

Cauliflower. Department seed. About 40 per cent made heads large enough for use, and were ready August 25. Quality fair.

Kohlrabi. Early Purple Vienna made a vigorous growth from the start and were ready for use August 20. They were small.

Radishes. Germinated quickly; 50 per cent were injured by root-maggots, the others were small and of poor quality. They tended to run to seed.

Cress. Department seed made rapid growth and was ready for use in six weeks. It seeds quickly.

Kale. Tall Green Scotch; 50 per cent germinated with rapid growth, was large and of fair quality.

Onions. From seed, small percentage germinated. They were about 1 inch in diameter by September 15. From sets, tops were ready in July, but roots were small.

Beans. Wardell Kidney Wax came up slowly and were killed by the frost soon after blooming, August 18.

Rhubarb. The rhubarb on the farm has not winterkilled. The stalks are about 1 inch in diameter and 1 foot long. The growth was rapid and the quality good. Ready for use from June 20 until after frost.

We have successfully raised dwarf sweet peas, mignonette, dwarf nasturtiums, and pansies.

AMONG THE FARMERS.

There are submitted herewith some photographs, which tell more vividly than words can depict the progress of farming in Alaska.

Plate XIII, figure 1, shows the Hinkley dairy herd at Fairbanks. Mr. Hinkley keeps a dairy of some 30 cows. He finds a good market for milk at remunerative prices in the town of Fairbanks. The cattle would do credit to a dairy herd anywhere in the States, and as they are seen there pasturing in native meadows at latitude 65° N., it speaks eloquently for the possibilities of the country. This is not an experiment, but a business enterprise, run by a practical man, who makes his business remunerative.

Mr. William Young is another practical farmer located in the neighborhood of Fairbanks. The writer visited him one morning while he was engaged in cutting his barley crop for hay, as shown in Plate XIII, figure 2. The barley was almost ripe, and it would have ripened completely in a few days, but it was at the right stage to cut for hay and he fed the grain and straw together. He practices diversified farming. He keeps cattle, hogs, and chickens, and raises grain, potatoes, and other vegetables—anything for which there is a market and which he can produce profitably. He said the hogs paid him well, the carcasses selling for from 35 to 45 and sometimes as high as 50 cents per pound, according to the scarcity of the supply, and he is supplied with the facilities to keep them. There is a large cellar under one of his barns, which can be heated by an old steam boiler when extreme cold weather makes it necessary. He feeds them largely on the products of his own farm—turnips and other roots, inferior vegetables, small potatoes, and grain of his own raising—and of course he winters only the breeding sows and a boar. Mr. Young said that fresh eggs were worth from \$2 to \$4 per dozen, and he stated that the chickens paid well.

Another successful farmer is John Charley, a French Canadian, who is one of the most successful market gardeners at Fairbanks. He understands the business thoroughly and knows how to make it pay. He works a few acres in the outskirts of the city on a most intensive system of culture. He has two greenhouses, in which he grows tomatoes, cucumbers, melons, lettuce, and, in fact, anything that will pay. They also serve as propagating houses for his cabbage, cauliflower, and other garden truck. In Plate XIV, figure 1, John Charley may be seen standing among his celery, which was then ready to market; his greenhouses are in the background. His cabbages are famous throughout the region. He showed me many heads that ranged in weight from 20 to 30 pounds each, and one head which he stated weighed 33 pounds.

There are some half dozen other market gardeners in Fairbanks who are equally successful, and some of them operate on a large scale.

The chief element of success in market gardening there, as everywhere else in Alaska, is to use an abundance of fertilizers.

But Fairbanks is not the only place where farming is practiced successfully. Hyde's ranch, 8 miles below Fairbanks, is a well-known farm. (Pl. XIV, fig. 2.) About 300 miles from there, as the crow flies, is the town of Seward, on Resurrection Bay, where Mr. C. E. Burr is a successful market gardener. Mr. Burr writes that he finds the business profitable.

LETTERS FROM SETTLERS.

Rev. F. R. Falconer, Klukwan.—We have had a delightful summer and are now having a fine open fall. Not a flake of snow has fallen so far, October 31, while we have had as much as 15.5 inches before this time in previous years.

Our vegetables turned out unusually well this season. I think the potato crop was the best I have ever had. I believe the abundance of sunshine we have had, together with pretty thorough irrigation, accounts for it. I planted 180 pounds and dug 2,300 pounds. The potatoes planted were Garfield, Freeman, and Early Rose. The first two varieties were received from you a few years ago. They both do well here, the Garfield yielding a little better, I believe, but it is not quite so fine in flavor as the Freeman.

The hybrid strawberry plants which I brought from Sitka in September, 1910, are strong and healthy, but yielded no fruit this year. They blossomed and fruit formed, but for some reason or other we never got a ripe berry. They did not seem able to get beyond a certain stage, and finally disappeared. The soil is quite sandy and perhaps not sufficiently fertilized.

Chantenay carrots missed badly; the half-long Danvers were good. Petrowski turnips did well; the worms did not trouble them. Other turnips and rutabagas were wormy.

There were more potatoes planted in the village than ever before. Between 4 and 5 tons were dug this fall. We are trying to get a horse and a few farming implements, and if we succeed there will be still more done in an agricultural way next season.

We hope to make this a source of revenue to the people. There is no reason why these people should not be able to raise enough vegetables for their own use and to supply the mines beyond us as well.

I believe you told me once that sweet corn could not be grown in Alaska. Three years ago I brought from Manitoba, Canada, some Squaw corn. It failed with us, but the following from a letter from Mrs. McRae, Mud Bay, 8 miles below Haines, tells the results obtained from the planting of some we gave her:

"We have 57 ears of corn, 2 are 10 inches long, several are 8 inches long, while the average length is 7 inches. They have nice kernels. It was put in late and only hoed once, so you see it did not have a very good show, but has done extremely well. We feel like giving it another test and better culture. This is our third trial; have had some fairly good ears every time."

W. J. Bennett, Porcupine.—It has been very dry and warm here this season, and although we were not prepared in the spring to get the crop in early, and the ground is in very poor shape, we have a fine crop in sight.

We sowed about 6 acres of oats, some common feed oats, and they matured early and are now cut and in shock. The others were American Banner and are very heavy, but are not ripening so fast. They were the last sowed and we had no rain for six weeks after, but they came on slowly.

Peas of common field variety are filling very well at present. Potatoes are doing very well and we look for a good crop. Turnips, cabbage, and small garden truck come along very fast, but the first two are being destroyed now by worms in the roots.

C. W. Presnall, M. D., Haines.—I was sorry that I did not meet and have a talk along the fruit line with you when you were here last. I tried some strawberry plants this spring, planting 147 sprouts. I gathered more than 35 quarts of berries from them. I also put out some raspberries and gooseberries, but, of course, they did not bear this year.

My garden did well. I put out about 100 cabbage plants and the worms killed about 40, so I deposited a drachm of carbon bisulphid in a crowbar hole beneath the roots of the remainder and by repeating this every few weeks saved them, one head weighing 10½ pounds. My English peas did well.

I would like to put out as much as an acre of some varieties of hardy apples or crab apples if I could get information on the kinds to try. Mr. Adams has a tree which he tells me he showed to you, which was full of a species of crab apple when a forest fire caused all but two to drop off and the two remaining ones are thrifty apples.

Mrs. D. W. Yates, Windham.—Am sending you a report of the results of the seeds sent me last fall, or rather this spring.

Carrots, Chantenay and Oxheart, from a patch 8 by 4 feet, produced 40 pounds.

One package Finland turnips from patch the same size as above produced 90 pounds. The largest weighed 3½ pounds.

The White Egg turnip we left to grow all season. One weighed over 5 pounds, but after cooking was almost tasteless. I think it was overgrown.

From six plants of summer squash we had about one-half pound. I thought the frost would kill them, but they stood it well.

Tomato plants were all strong and had buds, but the first frost killed them.

My endive grew well, but it went to seed. I don't think I thinned it enough.

We tried oats (only a handful) and they headed well, but did not ripen.

One package of parsnips yielded 30 pounds.

Our soil is all newly planted and we did not plant until after the 1st of June, as we had snow on the ground.

From 30 strawberry plants we had 3 quarts. The currants and raspberries which we received from you I think will bear this year.

We were using seaweed to fertilize, but use guano now, as we have chickens. Our chickens did well last winter and summer. For green food we fed them the winter ferns, which grow in great abundance in the woods.

Everett Wilcox, Petersburg.—We had 1 acre of ground planted last year, about one-third of which was planted with turnips. We got about 3 tons of those and about 1,500 pounds of potatoes from the same amount of ground. From ground measuring 85 by 3 feet we had about 150 pounds of beets, the largest of which was 5 inches in diameter. We had about 100 pounds of carrots in ground measuring 80 by 2 feet. There were 100 heads of cabbage, the largest of which weighed 10 pounds. The radishes and lettuce and green peas did well, and the flowers were splendid.

I forgot to mention that in one hill of potatoes we got 26, weighing from 3 ounces to one-half pound.

If you can send some Freeman potatoes here, we will be much obliged. We would also like some seeds. The seeds we got from you did far better than the seeds we got from the stores here.

Fred Patching, Loring.—Just a few lines to let you know what success we had with the garden here. Radishes did well; lettuce did fine; rutabagas did

fairly well; early cabbage yielded about two-thirds crop; rhubarb did splendidly; horse-radish fair, and peas did the best I have ever seen, making an enormous crop. Parsnips did fine and carrots yielded about half a crop. Raspberries produced about half a crop also.

We had green onions and lettuce for Thanksgiving dinner, and I think that would puzzle some of the States to do, where the people think Alaska is nothing but a land of snow and ice.

C. E. Burr, Seward.—I want to thank you for the garden seeds which you sent me last spring. I planted a large variety of seeds at that time, and now I think I know what will grow best here on the bay. Carrots, half long and stump rooted; parsnips, Hollow Crown; beets, Blood, turnip-rooted, and long; lettuce, all kinds; endive, all kinds; kohl-rabi; Swiss chard; corn salad; radishes; turnips; rutabagas; peas, Alaska, Thos. Laxton, Gradus, and Sugar; and potatoes all do well along the bay shore. And some seasons I have success with mustard, rhubarb, kale, cauliflower, and onions, but beans are a failure here. Root maggots destroyed a large portion of my vegetables even to mustard, onions, and kohl-rabi.

I spaded up the ground as soon as I had harvested the vegetables to see what effect that will have on them. I also used tobacco in the latter part of the season. A slug or maggot destroyed a great many, but left toward fall.

A. Hirvela, Knik.—I wish to thank you for the seeds and nursery stock you sent me in the spring. I have not much to report to you this year because nearly everything I planted was almost a failure. It was probably on account of the ground being too "raw" or new and mossy. As I understand, newly broken ground hardly grows anything the first year in this country.

The apple trees are all alive and some of them have grown fairly well, while some others have not grown any.

Currants, raspberries, and gooseberries are also doing well. Out of 200 strawberry plants only 14 are alive, but they have been growing fine. Cabbage and lettuce did grow some, but did not mature. Of all the varieties of turnips I tried the Petrowski did the best. Onions, beets, parsnips, and carrots did not come up at all. But I expect to do better next year.

Peter Murray, Knik.—I take pleasure in letting you know the results obtained from the seeds you sent me. I did not plant anything in a hothouse, as I was visited by a fire in the early spring and my buildings all burned to the ground. I planted the seeds you sent me on May 7, out in the open. Cabbage, lettuce, and radishes were up and doing well on May 17. Turnips, rutabagas, carrots, beets, parsnips, peas, beans, onions, and kale were up on May 27. The turnips did exceedingly well, particularly the White Egg variety. Rutabagas did well, also, and carrots did well on the second bench land, but did not do so well on lower or alder bottom ground. The peas filled out the pods splendidly. Kale also did fine. It grew large, but did not head out. Beans came up about 6 inches, but died out on the second and lower bench. Onions came up very thinly and were a failure. Cabbage I transplanted on July 13 and about half of them made good, solid heads. Beets did well on the second and lower benches.

I also received a small package of seeds which you sent me on September 15. I was away from home a good deal of this year, as I had some placer ground to work. I planted about 80 pounds of commercial potatoes and got 800 pounds from them when I dug them. I also sowed some barley on alder bottom land, which grew about 30 inches and matured; oats did about the same.

Thos. W. Hanmore, Iliamna.—I received two of the four packages of garden seed you sent me last spring. I planted all the garden seed on June 15, while there was some frost remaining in the ground. I raised a few rutabagas and turnips, all of them very small. Down on the lake, at Mr. Millet's and Mr.

Borland's, they had better success. The high and low bush cranberry crop was very large. Also the huckleberry and the red and black currant yield was heavy. The crop of blue-stem wild hay was also long and thick.

There was very little sunshine for this locality. It was a very wet season. The old snow is much in evidence at a low altitude. It frosted every month throughout the summer. The frost was heavy enough to kill potatoes the last of August.

I am preparing a larger plat of ground and can use a couple of packages of garden seed, but no flower seed.

Hannah E. Breece, United States teacher, Iliamna.—The 24 currant bushes, 24 raspberry bushes, 4 rhubarb plants, and 12 apple trees arrived in Iliamna in good condition. They arrived here in May, but the ground was frozen. They could not be planted until June 17. We had a very late spring. I kept the plants in the cellar and they were moist and in good condition. All are growing except the rhubarb; that has died. I think it was because it was bleached white when I planted it, for I gave two plants to the commissioner here, Judge Hammore. One of his was bleached; it died. One was not; it is a healthy plant now.

The seeds all arrived. I sent some to Noondalting, also some to Nurailing and to Kaskanak.

I did frontier work in Noondalting this summer. There were three or four gardens and, considering the adverse weather this year, they looked well. I did not get to Nurailing, but hear that the chief tried to make a garden. After they see one they will know better how to go about it.

I tried very hard to have the natives in this village make gardens. Owing to the late spring and great scarcity of food (some had to go and hustle for game) there was not much progress made. But I feel glad that the ice has been broken, for three gardens have been fenced in by the natives and one woman worked half of my garden for herself. Two gardens will give a fair yield of turnips.

After planting my seeds I had to go away. In 45 days I came back. The weeds had nearly choked the plants. The village, of course, is not inhabited during the summer, so turnips and preferably rutabagas are the best crops to plant for natives.

I have had lovely lettuce and crisp, tender radishes. The beets have done quite well and in a good season, with proper care, would be a good crop. Carrots do well. The peas will be bearing very plentifully if the growing weather only continues a week or two.

Last night it only lacked 5° of being at the freezing point. To-day is sunny and much warmer. The parsnips are just tiny plants and the turnips are very small, but they grow rapidly when they start.

I tried flower seeds. The nasturtium plants look thrifty, but I must "pot" them and take them indoors to bloom. The poppies are spindly and not blooming yet. Candytuft is thrifty and blooming. I could not give flower seeds out, for the natives would be disappointed if they could not eat them. It will be a few years before they become accustomed to this.

About Lake Clarke the climate is much better for gardening than it is here in Iliamna village, although some years it is very good here. Mr. Peter Anderson, a white trader, has had a garden here for several years. Mr. Foss has had one also for two or three years, I think. Now Mr. Hammore has broken a large garden. So in the near future it is hoped that Iliamna will not have to "take a back seat" in her agricultural life.

I consider that the making and fencing in of the few gardens the natives have made is of great importance. It took me two years to lead them to

that much. We also cleaned up the "village green" this spring for the first time in its existence.

With everything comparatively clean and with the few little garden spots, even though the old log huts are bad, there is a certain air of thrift which was not there before.

I am going to send some of the flower seeds to Afognak and Kodiak, where I know they will grow, if you do not object. There are many seeds here that will not be used for two or three years to come. I will send those also where they will do good. Beans will not grow here. Potatoes would, if I only had seed. Thank you very much indeed for all your help.

J. L. Brown, teacher, Unalaska.—First. The choice of location was of material importance, so we chose the land where there was as luxuriant a growth of what is called putsky or wild celery as was to be found. Second. In breaking the ground the first time I took great pains to plow it deep and to cover all weeds and grass. I then cut the top of the ground with hoes so as to get loose soil without breaking the sod.

In this top-dressing we planted oats, wheat, alfalfa, clover, and garden vegetables. On this virgin soil we had great quantities of Early Breakfast radishes, Long Red and Blue and White turnip radishes, and lettuce.

The oats grew very large and made excellent ensilage the first year.

We had a very large and excellent yield of turnips, having about 150 bushels on one-third acre of ground. The largest and those which made the greatest yield were planted in rows and as they began to grow we thinned them out and used them as greens, cultivating between the rows as long as it was possible to get the garden cultivator through.

The wheat, rye, alfalfa, and clover lived over winter and made a very good showing in the spring of 1910, and when I left Unalaska, August, 1910, the wheat and rye were ready to cut for ensilage.

In the spring of 1910 we turned the soil up and found it well rotted and a fine loose soil which was enjoyable to work in. We again planted radishes, onion sets, lettuce, turnips, rutabagas, and potatoes, all of which made excellent yields.

In planting small seeds, as turnips and radishes, I found that it hastened sprouting and increased the yield by tramping the ground after the seeds were planted.

I did not make raised beds as had been the custom in that location, but planted everything in rows that we might use the garden cultivator.

We had new potatoes before we left Unalaska, August, 1910.

Rev. S. H. Rock, Bethel, Kuskokwim River.—The past season has been a poor one for farming in our section. Many days and nights the thermometer has nearly reached the freezing point. In August we had a frost which blackened potato leaves. Cabbage grew well but did not head as well as it should. We made some into sauerkraut but stored the looser heads in boxes and barrels in the garden. We have made many meals of this cabbage. Turnips did fairly well and radishes also. Cauliflower did nicely. The heads were beautiful and sweet. We had very little trouble with worms this year.

For two years we have tried the sprouting plan for potatoes and to that fact we owe our having a crop this year. Other gardens yielded scarcely any, while mine yielded between 8 and 9 crates, and they were nice ones. I would advise any Alaskan living in a section where the season is short to follow this plan. We put out planting potatoes in a layer in hotbeds under glass and cover them lightly with ground. Then occasionally we sprinkle them. By the time the garden is ready the plants will be several inches high and the leaves well started, with rootlets in abundance. Then set in rather shallow holes

and plant as other plants are set out in like stage of growth. I would say, too, that our theory, borrowed, of course, is that nice, large, perfect potatoes split into two or three pieces give by far the best yield of fine, smooth, shallow-eyed potatoes. In all life reproduction this theory holds good: "Like begets like." And no improvement in species or genus can be expected if one combines poor stock or plants inferior seed. Of course there is more work in being particular, but the results are correspondingly profitable and interesting. I would make mention here of a potato plant which yielded only a handful of small potatoes, I think eight in number, from the size of a small hen's egg down to the lima bean. Not one of these was in any way deformed. All have perfect shape and beautiful eyes. This plant grew in the ground of a flowerpot. The ground was taken from the potato garden last fall. I had noticed some seed pods on the plants, but did not have an idea that the seed would amount to anything. We planted this plant in the hotbed among the flowers. It was precious, and now we are keeping these little beauties for next year's planting. The wonder of it is this: The ground was kept out of doors over winter and this seed was frozen in the ground for many months. We think and hope that from these we may start an exceptionally hardy potato. What do you think of it? I shall watch results with interest and report next year. I ought to mention that in sprouting our potatoes we placed them in a hotbed about four weeks before planting time.

I inclose a specimen of the seed pod and seeds of that turnip you sent us. We saved the nicest one last year and planted it this spring for seed. The summer was so cold that we feared the seed would not mature. When frost came we cut the top and dried it in the house. Recently my wife planted some of the seeds to see whether they would grow. She did not count the seeds planted, so we can not tell what percentage grew, but I should judge at least 75 per cent, for the dish was green. This turnip was not attacked by the worms.

The inclosed sample of rutabaga seeds are also of our raising. We got the first seed from Philadelphia. These also were worm proof.

John W. Chapman, Anvik.—The season here has been a remarkable one. An extremely late spring was followed by a season of dry weather in July, and by a fall so late that rutabagas and cabbages have stood out until September 30, the only moderately sharp frost having been September 14.

Notwithstanding the lateness of the spring, most crops did well. Potatoes, carrots, beets, turnips, Swiss chard, and cabbages were successful; rutabagas, moderately so. Cauliflower was a failure. The Petrowski turnips have won favor for their general excellence, good appearance, and good keeping qualities.

Swiss chard is an experiment, but very satisfactory and much liked. The Wakefield cabbage is the only one that we can rely upon, so far as our experience goes.

Grass was unusually good this year, but rains have interfered with the haying.

Our success with keeping Shorthorn grade stock has been excellent. With Holsteins we have had no satisfaction, but a Durham and Holstein grade heifer of 2 years is as promising as can be.

A great part of the living for the mission school during the past year has come from the garden and the herd, notwithstanding that last year was one of the most unfavorable for gardens that I have seen in over 20 years. The usefulness of gardens does not need to be demonstrated to us.

Gertrude K. Nielsen, United States Government teacher, Fort Yukon.—Our garden did not do as well as we had expected it to do. The soil seems to be quite sandy and had never been worked before. We are hoping to have better results with our next attempt, however.

We started cabbages in boxes indoors during the latter part of March and transplanted them during the third week of May. Only 6 formed heads, but I think most of them would have done well if they had been kept well watered.

We sowed radishes and lettuce May 9 and picked out the first radishes June 14. The first beds of radishes did well, but those sowed later were destroyed by a small white grub, as were also the turnips. Every kind of lettuce did well. The Dwarf peas sown May 9 were ready for use July 10. The carrots, onions, parsnips, and beets were failures. The beaus grew well for a short time and were then killed by a small white grub or worm. The potatoes were above ground June 15 and looked fine, but owing to the lack of rain they did not do well.

The flowers were a splendid success. California poppies, sweet peas, pansies, and several other varieties bloomed until the second week in September.

There were several private gardens in the village which were successful. They grew splendid peas, potatoes, turnips, and some small but firm heads of cabbage.

James D. Wiest, Fairbanks.—I will endeavor to let you know what I have been doing during the past summer. The apple trees you sent me were all alive when winter set in. They did not make much growth, but looked healthy. There was only one plum tree alive, but I never did see anything grow like it did. It grew over a foot. I have four crab apple and two apple trees that I set out last year. They made from about 20 inches to 2 feet in growth. I also received some trees from a nursery which were two months and six days on the way, and most of them were alive. I set them out July 26, and they leaved out, while some of them made 2 inches growth. About half of the currants and raspberries are alive, as is one gooseberry plant.

I had a good crop of potatoes on the old ground, but the new ground did not do much. I sold 2 tons for 7 and 8 cents per pound. They have the name of being about the best potatoes that came into Fairbanks this year. They were mostly Freeman, and the other kind I do not know. They are round-oval in shape and russet in color, with a pink eye. I also have two new kinds of potatoes. They are purple in color, and the inside is very white. Last year, when I was digging the potatoes, I found a little purple potato about as big as the end of my thumb. It was in a hill of Freeman. I saved it and planted it last spring and got 5 pounds from it. They are the shape of the Freeman, but a dark purple color. This fall I found three purple ones in a hill of those pink-eyed potatoes. They are not as dark as the others and are round-oval shaped. I saved them and will plant them in the spring and see what I can get out of them.

Everything else did fine excepting cabbage, cauliflower, and turnips, upon which the maggots worked too much.

My grain did not do very well, for I sowed it on new ground, and it was also too dry for some time.

Frank E. Howard, commissioner, Coldfoot.—My experiments during the past two years have proven that I can raise celery of the Golden Self-Blanching and White Plume varieties and onions of the Yellow Danvers and White, Portugal varieties in open garden. I start the celery plants in my south windows and transplant as early as possible into open garden in the spring. I raise my own onion sets and the following spring set them out in open garden. It takes two seasons to raise an onion, the sets yielding fine green table onions quite early in the season, and later onions as large as good-sized eggs. The Yellow Danvers are the best winter keepers; in fact, I have fresh solid onions long after the outside stock is exhausted. This season I will sow several varieties of onion seeds for sets next season.

The best producing turnip I have so far experimented with for winter use is the Finland Petrowski, I think, sent me from your station. I would be pleased if you would send me several packages of the same seed for next spring planting, by registered-letter mail, otherwise it will not reach me in time.

I have received by mail several packages of berry roots sent from your station, but they were all dead when they reached here. The only way to have roots and plants reach here alive would be to ship them to catch the first upcoming mail boat in the spring, reaching here in July. I am sure if the roots once got a start they would stand the winter, with some protection, and in the future bear fruit, as wild berries thrive here in abundance. My wife planted a few strawberry seeds, which by fall produced strong, healthy plants with long creepers. When frost came in the fall I covered the plants with straw. The roots lived out the winter and grew large, healthy plants that blossomed and produced green berries as large as peas, but none ripened. We are quite anxious to see what these plants will produce next summer.

Vine crops, such as cucumbers, tomatoes, etc., will undoubtedly do well here under glass, or otherwise sheltered from the cold nights which we have at intervals at the breaking up of storms. In the open garden I have raised cucumbers 6 inches in length and tomato vines 2 feet high that blossomed.

The Koyukuk Valley and tributaries have thousands of acres of good agricultural lands and only two homestead entries filed to date.

Last fall I received a new plow, cutter, and harrow, intending to do some experimenting in the raising of grains. I believe, from past successes, that oats, wheat, and barley will ripen here.

James L. Reed, Kotzebue.—I feel ashamed of not having written you before. You sent me seed in 1906, some of which I planted; but I was mining then and could not attend to this work as I should have done. I have taken a homestead here and have a garden of 1 acre under cultivation, which is fenced with woven wire. I am now in the fish business and this leaves me time to attend to gardening. I shall clean off the moss and rock from a half acre yearly, until I have 3 or 4 acres. I find that when I take the moss off the year before and spade it up and put fish cleanings on it the ground produces a crop in a phenomenally short period.

I had lettuce for use June 20, and it was full grown July 4. I can raise a better quality than can be raised in the State of Iowa, as it grows faster and is more brittle and tender. I have potatoes, peas, beans, beets, radishes, turnips, kohlrabi, Brussels sprouts, onions, mustard, and kale, all of which are at this date bidding fair to mature. I would like to see if I can raise rhubarb, sage, and strawberries.

I would keep a cow if I could raise the hay for her. I would like to try red-top, millet, Hungarian, timothy, and clover. Some of them might do well.

Would also like a few currants, gooseberries, cherries, grapes, or any kind of fruit trees that you think might be raised with success in this country. They could be protected by grass and willows to catch the snow in the fall and be uncovered in spring at the proper time. Should you send shrubs this fall, I could set them out in the spring. If not, please send next spring on first boat. Navigation does not open here before July 4.

John Harris, Pilgrim Hot Springs, Kougarok.—I sowed the Russian Finnish turnip seed on June 6. On July 10 the turnips were 3 inches across; on August 10 the turnips averaged 1 pound apiece. On August 27 Mrs. Schofield and Mrs. Christen took my picture with a turnip that weighed 5 pounds.

On September 13 I pulled the turnips, and one of them weighed 8 pounds.

The radishes did well also, and the lettuce. I wish you would send me some more of that Finnish turnip seed.

CLIMATIC DATA.

The following tables concerning the weather are greatly condensed from the original records. By a careful study of the figures one may gain a fairly accurate idea of the climate which prevailed in 1911 in Alaska. The temperature is all recorded in degrees Fahrenheit and the precipitation in inches. The column headed "Maximum" gives the highest temperature reached during the month, and the column headed "Minimum" likewise gives the lowest temperature reached during the month to which it refers. The daily mean is not an average between the highest and lowest temperatures; it is the mean of the temperatures recorded for each day during the whole month. The column headed "Total precipitation" gives the amount of rain and melted snow in measured inches which fell during the month to which it refers. The remaining four columns give the number of days of clear, partly cloudy, and cloudy weather during the month, and also the number of days on which 0.01 inch or more of rain or snow fell.

Condensed meteorological reports.

FORT YUKON. Latitude 66° 30', longitude 145° 15'. Mrs. Grafton Burke, observer.

Month.	Temperature.			Total precipitation.	Number of days—			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.				Inches.				
May.....	66	22	45.5	0.10	17	3	11	4
June.....	89	41	67.0	.....	24	4	3	.....
July.....	88	39	67.2	.....	20	2	9	2
August.....	87	23	50.0	.09	.....	.....	.....	2
September.....	60	10	37.7	.03	.....	.....	.....	2
October ¹	45	0	21.8	.23	12	5	14	2
November.....	18	-43	-15.6	.10	.....	.....	.....	1
December.....	15	-57	-22.0	1.10	.....	.....	.....	2

COAL HARBOR. Latitude $55^{\circ} 24'$, longitude $160^{\circ} 49'$. N. Christensen, observer.

1911.							
January.....	60	10	36.0	1.90	..	..	..
February.....	50	15	34.9	3.20	..	..	..
March.....	78	9	36.2	.11	..	..	..
April.....	57	- 4	33.8	.34	..	..	..
May.....	60	20	42.4	.60	..	..	..
June.....	69	30	47.0	1.70	..	..	..
July.....	68	40	53.0	0.40	..	..	..

COPPER CENTER. Latitude 62° , longitude $145^{\circ} 5'$. L. A. Jones, observer.

1911.								
January.....	31	-57	-12.1	0.10	15	11	5	2
February.....	49	-40	4.4	1.73	9	10	9	4
March.....	48	-46	8.8	.19	12	11	8	2
April.....	53	-22	27.8	.06	9	14	7	2
May.....	65	18	42.4	.18	6	18	7	1
June.....	85	22	53.7	.20	10	14	6	2
July.....	86	22	56.6	1.12	8	15	8	6
August.....	85	23	53.8	2.72	10	18	3	5
September.....	73	13	44.3	1.85	10	9	11	6
October.....	53	5	31.6	.74	5	12	14	3
November.....	39	-29	2.8	.65	9	9	12	5
December.....	50	-36	- 1.3	.....	13	5	13	.....

Condensed meteorological reports—Continued.

CANDLE. Latitude 66°, longitude 161° 50'. R. S. Dimmick, observer.

Month.	Temperature.			Total precipitation. Inches.	Number of days—			
	Maxi-mum.	Mini-mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.	°F.	°F.	°F.	Inches.	6	1	24	(1)
January.....	(1)	-40	(1)		2	.....	26	(1)
February.....	(1)	-38	(1)		9	1	17	(1)
March ²	(1)	-48	(1)		15	.....	12	(1)
April ²	(1)	-20	(1)		8	4	16	2
May ²	(1)	16	(1)		12	5	12	1
June ³	(1)	26	(1)		7	1	22	5
July.....	(1)	34	(1)		5	2	24	15
August.....	85	28	52.0		6	1	20	9
September ²	75	26	43.8		6	2	23	9
October ⁴	47	7	32.0		6	1	20	2
November.....	34	-22	10.3		9	1	16	13

CALDER. Latitude 53° 8', longitude 132° 27'. John McCallum, observer.

1911.								
January.....	44	2	21.2	10.15	9	4	18	14
February.....	42	1	30.0	6.60	6	7	15	15
March.....	45	13	33.2	7.92	5	10	16	20
April.....	59	16	35.2	9.55	12	6	12	17
May.....	58	27	42.4	3.23	10	12	9	16
June.....	68	29	47.6	2.62	6	8	16	13
July.....	85	33	51.8	2.05	7	13	11	10
August.....	81	35	52.2	2.70	17	10	4	7
September.....	77	25	48.4	6.90	9	7	14	16
October.....	60	23	41.6	10.35	7	8	16	18
November.....	50	10	31.4	13.25	8	5	17	21
December.....	51	12	32.3	16.80	4	8	19	23

BARROW. Latitude 71° 18', longitude 156° 00'. H. R. Marsh, observer.

1910.								
September.....	54	18	31.0	1.00	7	1	22	2
October.....	40	-12	16.6	.15	6	9	16	2
November.....	33	-26	10.4	.10	6	3	21	1
December.....	29	-33	-13.3	.40	18	.....	13	3
1911.								
January.....	24	-45	-23.0	T.	20	2	9	0
February.....	35	-46	-14.0	.25	15	3	10	3
March.....	26	-50	-22.7	0	24	2	5	0
April ⁵	29	-30	-4.6	.....	13	.....	3	.....
May ⁶	44	8	23.8	.25	1	6	18	2
June.....	64	22	37.2	T.	22	2	6	0
July.....	66	31	45.6	.01	16	3	12	1
August.....	58	32	42.5	.06	9	2	20	4
September.....	54	23	35.6	T.	11	5	12	0
October.....	38	8	27.1	.20	4	4	23	2

KETCHIKAN. Latitude 55° 25', longitude 131° 35'. B. L. Myers, observer.

1911.								
January.....	46	0	26.1	8.51	16	.....	15	12
February.....	45	2	33.9	7.24	10	2	16	11
March.....	48	24	37.0	8.96	14	.....	17	11
April.....	62	19	38.2	11.99	10	4	16	9
May.....	60	30	45.5	2.26	14	4	13	5
June ⁷	64	28	48.2	6.43	7	7	8	5

¹ No record.² No record for 3 days.³ Out of town 2 days.⁴ No record for the 16th.⁵ Only first 16 days given.⁶ No record for first 6 days.⁷ Only the first 22 days in this month given.

Condensed meteorological reports—Continued.

NIZINA. Latitude 60°, longitude 142° 20'. George Max Esterly, observer.

Month.	Temperature.			Total precipitation. Inches.	Number of days—			
	Maximum. °F.	Minimum. °F.	Daily mean. °F.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.								
May ¹	58	22	38.7	0.10	9	5	1	1
June.....	72	22	46.1	T.	19	11	0	0
July.....	75	32	50.5	3.58	15	6	10	10
August.....	76	29	52.2	1.50	25	4	2	4
September.....	75	26	43.8	3.29	18	6	6	8

HAINES. Latitude 59° 14', longitude 135° 26'. C. W. Presnall, observer.

1911.								
August ²	76	38	57.1	0.80	18	.....	7	2
September.....	74	25	51.2	.99	12	.....	18	3
October.....	60	20	42.4	10.63	13	5	13	12
November.....	65	5	34.1	5.36	11	.....	19	11
December.....	61	1	32.2	4.44	13	2	16	15

FAIRBANKS. Latitude 64° 50', longitude 148° 9'. Deaconess A. Knox, observer.

1910.								
November.....	25	-30	- 1.0	0.52	14	3	13	3
December.....	32	-58	-12.8	.76	16	5	10	2
1911.								
January.....	20	-62	-23.8	.10	16	.....	15	5
February.....	43	-44	2.0	.04	10	2	16	2
March.....	39	-56	2.5	.04	23	3	5	1
April.....	54	-32	17.4	.....	17	4	9	.....
May.....	59	26	42.8	.16	13	3	14	2
June.....	82	31	57.2	.....	24	1	5	.....
July.....	84	36	64.1	2.16	5	18	8	11
August.....	85	28	56.6	2.30	5	7	19	12
September.....	80	22	45.4	1.60	4	11	15	13
October.....	67	11	35.3	.22	7	14	10	3
November.....	35	-34	- 2.8	.29	19	6	5	3
December.....	28	-45	- 6.1	1.23	7	5	19	18

HOLY CROSS. Latitude 62° 20', longitude 159° 50'. L. Sigouin, observer.

1911.								
January.....	28	-47	- 7.4	2.40	14	.....	17	5
February.....	40	-33	8.6	1.50	4	.....	24	4
March.....	36	-53	3.6	.20	16	.....	15	1
April.....	50	-18	20.7	.....	11	.....	19	1
May.....	54	19	38.8	.....	14	.....	17	.....
June.....	82	33	54.6	.....	20	.....	10	.....
July.....	84	41	59.8	.....	25	.....	6	.....
August.....	74	34	53.8	1.55	16	3	12	11
September.....	68	30	46.2	.....	16	.....	14	.....
October.....	55	24	36.8	.....	22	.....	9	.....
November.....	33	-14	10.6	.....	22	.....	8	.....
December.....	35	-33	- 4.4	.....	21	.....	10	.....

¹ Record only for last 15 days.² No record for first 6 days of this month.

*Condensed meteorological reports—Continued.*SEWARD. Latitude $60^{\circ} 1'$, longitude $149^{\circ} 30'$. W. A. McNeily, observer.

Month.	Temperature.			Total precipi- tation. <i>Inches.</i>	Number of days—			
	Maxi- mum. $^{\circ}$ F.	Mini- mum. —.5	Daily mean. 23.5		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1910.								
December.....	45	—.5	23.5	4.91	17	.....	14	7
1911.								
January.....	41	3	23.2	1.45	23	.....	8	3
February.....	41	2	24.8	5.67	10	1	17	9
March ¹	48	—7	27.3	2.30	17	2	11	7
April.....	56	18	33.5	4.12	13	5	12	10
May.....	57	26	40.4	2.66	6	14	11	12
June.....	68	32	46.0	2.95	12	8	10	10
July.....	83	42	54.6	1.89	15	3	13	8
August.....	85	36	59.2	2.55	23	4	4	5
September.....	64	35	50.4	3.28	14	5	11	9
October.....	53	31	42.4	9.30	7	9	15	16
November.....	47	9	30.6	4.96	12	1	17	9

ALLAKAKET. Latitude $66^{\circ} 45'$, longitude $151^{\circ} 10'$. Deaconess C. M. Carter, observer.

1911.								
January.....	7	—62	—31.3	0.65	17	1	13	12
February.....	38	—57	—1.4	2.05	4	10	14	15
March.....	30	—68	—9.6	.38	17	8	6	8
April.....	46	—42	11.2	1.08	12	14	4	7
May.....	57	16	40.8	1.81	7	16	8	15
June.....	87	30	55.8	.29	5	22	3	6
July.....	81	40	60.9	2.29	3	24	4	9
August.....	79	20	51.8	1.59	11	7	13	7
September.....	79	12	43.7	1.41	7	9	14	14
October.....	44	7	29.6	.71	5	11	15	9
November.....	28	—38	—12.1	.38	19	.....	11	6
December.....	16	—59	—19.2	1.04	7	5	19	13

SITKA. Latitude $57^{\circ} 3'$, longitude $135^{\circ} 20'$. M. T. Georgeson, observer.

1911.								
January.....	46	6	26.0	7.99	12	1	18	17
February.....	49	4	35.2	7.37	4	6	18	18
March.....	48	12	35.0	8.69	5	2	24	19
April.....	50	17	37.2	6.06	4	7	19	17
May.....	57	30	44.0	3.21	9	5	17	17
June.....	71	34	49.4	3.31	6	3	21	18
July.....	85	41	55.6	2.84	9	3	19	19
August.....	79	40	58.2	1.94	9	7	15	12
September.....	80	33	53.4	5.96	8	6	16	16
October.....	63	32	49.1	10.28	11	3	17	18
November.....	59	14	36.4	8.36	8	4	18	19
December.....	52	13	35.6	12.52	7	1	23	25

RAMPART. Latitude $65^{\circ} 30'$, longitude $150^{\circ} 15'$. G. W. Gasser, observer.

1911.								
January.....	1	—61	—28.9	1.05	13	7	11	10
February.....	40	—51	—1.6	2.20	4	4	20	13
March.....	37	—45	—1.0	.31	12	3	16	4
April.....	60	—31	21.1	.75	15	6	9	3
May.....	68	23	46.6	.48	12	6	13	6
June.....	91	27	59.4	.34	9	13	8	6
July.....	89	38	63.8	.43	7	15	9	6
August.....	85	25	56.3	1.12	9	11	11	7
September.....	79	23	46.2	.79	9	4	17	8
October.....	58	10	(2)	.57	5	9	17	7
November.....	—40	—	—	.21	17	2	11	4
December.....	—54	—	—	.85	3	6	22	10

¹ Record for 30 day. only.² Maximum thermometer was broken on Oct. 11, therefore a mean daily average for the month is impossible.

Condensed meteorological reports—Continued.

KODIAK. Latitude 57° 47', longitude 152° 20'. M. D. Snodgrass, observer.

Month.	Temperature.			Total precipitation. <i>Inches.</i>	Number of days—			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.								
January.....	45	9	28.7	2.00	9	19	3	5
February.....	46	8	29.4	2.98	3	17	8	13
March.....	44	2	29.8	3.24	6	19	6	10
April.....	51	17	30.8	4.44	2	17	11	16
May.....	58	22	40.1	3.01	2	26	3	13
June.....	74	34	45.7	7.57	3	16	11	15
July.....	76	35	52.4	1.78	3	23	5	12
August.....	82	35	57.2	3.53	3	22	6	10
September.....	63	35	49.8	2.77	2	23	5	11
October.....	58	25	43.5	9.85	.....	16	15	20
November.....	47	15	34.4	9.32	4	17	9	18
December.....	40	3	28.0	4.71	3	18	10	16

CHICKALOON. Latitude 61° 47', longitude 148° 27'. H. H. Hicks, observer.

1910.								
December.....	34	-25	7.9	0.51	16	4	11	3
1911.								
January.....	29	-33	3.8	.84	18	4	9	4
February.....	42	-28	13.8	2.47	9	5	14	9
March.....	43	-27	14.0	1.15	16	4	11	6
April.....	51	-12	27.8	.19	11	13	6	2
May.....	58	17	40.9	.13	4	16	11	3
June.....	77	27	50.4	.85	6	16	8	5
July.....	77	41	55.4	2.41	7	9	15	14
August.....	80	29	55.0	1.17	15	13	3	5

CORDOVA. Latitude 60° 35', longitude 146°. M. S. Whittier, observer.

1910.								
December.....	43	5	30.0	9.33	12	3	16	16
1911.								
January.....	45	5	30.4	4.91	15	7	9	10
February.....	42	11	30.0	13.69	1	18	9	20
March.....	46	1	29.6	8.07	8	12	11	13
April.....	47	15	30.8	14.79	7	9	14	15
May.....	57	28	41.4	8.42	3	13	15	21
June.....	73	34	49.0	8.74	5	14	11	17
July.....	78	45	55.2	4.37	4	11	16	15

DAHL. Latitude 65° 22', longitude 164° 41'. John A. White, observer.

1910.								
October.....	41	-2	26.4	.....	2	3	26	.....
November.....	36	-23	13.2	0.01	4	8	18	1
December.....	31	-62	-16.9	.01	21	7	3	1
1911.								
January.....	30	-54	-7.2	.09	9	8	14	5
February.....	35	-43	-3.8	.11	6	3	19	6
March.....	28	-60	-13.6	.07	17	12	2	4
April.....	46	-28	13.0	.11	10	18	2	17
May.....	47	14	34.3	.02	8	14	9	2
June.....	78	31	49.4	.03	20	8	2	1
July.....	80	34	54.5	1.20	12	10	9	6
August.....	70	24	49.1	2.72	2	8	21	9
September.....	70	25	45.2	1.16	5	12	13	4

Condensed meteorological reports—Continued.

DUTCH HARBOR. Latitude 53° 54', longitude 166° 32'. Fred Sehroder, observer.

Month.	Temperature.			Total precipitation. <i>Inches.</i>	Number of days—			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.	° F.	° F.	° F.					
January.....	52	16	33.8	6.88	6	20	5	7
February.....	49	24	34.8	10.53	1	22	5	15
March.....	46	8	34.6	4.94	3	24	4	6
April.....	46	15	36.6	6.10	2	27	1	8
May.....	50	30	40.8	5.74	.....	29	2	14
June ¹								
July.....	72	39	54.2	5.91	1	28	2	9
August.....	76	38	55.4	2.92	3	20	8	11
September.....	64	34	48.8	2.35	9	10	11	13
October.....	60	28	41.7	8.26	2	8	21	21
November.....	52	20	36.0	8.56	6	14	10	16
December.....	44	14	31.9	5.62	10	9	12	11

EAGLE. Latitude 64° 40', longitude 141° 5'. N. R. Meyers, observer.

1911.								
January.....	10	-62	-31.3	0.27	20	.....	11	6
February.....	45	-56	3.1	.24	8	2	18	5
March.....	41	-54	5.0	.39	10	3	18	9
April.....	59	-38	21.2	.97	11	8	11	8
May.....	66	20	43.8	2.87	4	6	21	13
June.....	85	26	55.6	1.26	13	12	5	8
July ²								
August.....	81	24	51.5	2.65	13	9	9	12
September.....	79	10	42.2	1.21	11	5	14	10
October.....	61	10	34.0	.13	.....			3
November.....	39	-39	.4	.29	.....			10
December.....	35	-47	-4.6	.80	.....			11

FORT LISCOM. Latitude 61° 7', longitude 146° 21'. Lieut. E. C. Jones, observer.

1911.								
January.....	37	2	19.9	1.98	20	7	4	8
February.....	45	0	19.9	5.11	8	6	14	14
March.....	42	-5	20.4	4.27	16	6	9	7
April.....	46	10	30.4	5.08	10	7	13	9
May.....	51	28	39.5	3.15	17	2	12	7
June.....	73	30	47.2	2.99	13	5	12	13
July.....	82	39	52.8	5.60	8	5	18	17
August.....	80	36	55.8	2.59	16	10	5	8
September.....	67	30	48.5	5.71	8	7	15	16
October.....	55	24	38.6	8.01	7	3	21	19
November.....	42	7	25.6	2.21	7	7	16	10
December.....	40	3	24.2	6.22	6	11	14	12

FORTMAN SALMON HATCHERY. Latitude 55° 20', longitude 131° 40'. Fred Patching, observer.

1911.								
January.....	41	-20	18.0	13.71	10	12	9	20
February.....	43	-21	28.2	12.28	7	10	11	18
March.....	45	12	33.8	18.44	5	12	14	23
April.....	59	9	35.2	17.53	7	11	12	19
May.....	69	25	44.7	6.90	11	9	11	20
June.....	73	37	50.8	7.13	4	17	9	23
July.....	85	40	57.2	6.28	8	11	12	17
August.....	85	42	60.6	2.63	14	12	5	8
September.....	83	32	54.2	8.02	9	5	16	17
October.....	61	27	45.8	12.49	8	10	13	19
November.....	51	7	33.0	14.28	6	4	20	17
December.....	50	4	33.2	21.72	5	6	20	26

¹ No record for this month. Emil Ittner became the observer, taking charge July 1.² No record for July.

Condensed meteorological reports—Continued.

KENNECOTT (near Nizina). H. J. Watkins, Jr., observer.

Month.	Temperature.			Total precipitation. <i>Inches.</i>	Number of days—			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.	° F.	° F.	° F.					
September.....	66	28	43.8		15			15
October.....	43	14	34.2		11			20
November.....	42	-14	12.0		11			19
December.....	37	-27	10.2		2			29

KLUK WAN. Latitude 59° 25', longitude 136°. F. R. Falconer, observer.

1911.								
January.....	36	-23	5.3	1.09	9	1	21	10
February.....	46	-26	18.8	2.32	8	2	18	14
March.....	43	-14	23.8	1.06	13	5	13	10
April.....	54	4	32.4	.39	10	3	17	6
May.....	70	25	45.0	1.46	11	5	15	9
June.....	80	28	52.8	.72	13	2	15	10
July.....	84	36	56.1	1.07	15	6	10	6
August.....	79	36	56.9	.76	19		12	8
September.....	73	23	49.4	1.72	11	3	16	9
October.....	55	15	40.9	5.07	8	4	19	12
November.....	46	-10	22.2	3.83	11	2	17	8
December.....	43	-13	21.9	3.12	8	2	21	15

MILLER HOUSE (near Circle). Jay F. Kelly, observer.

1911.								
January.....	10	-41	-17.0		13	10	8	
February.....	56	-41	6.0		8	7	13	
March.....	64	-42	9.9		10	10	11	
April.....	62	-21	24.2		16	8	6	
May.....	66	22	43.9		13	6	12	
June.....	91	31	56.4		20	5	5	
July.....	84	33	61.8		6	25		
August.....	89	30	56.4		20	4	7	
September.....	88	16	46.1		14	7	9	
October.....	81	10	42.6		15	5	11	
November.....	66	-27	2.4		13	6	11	
December.....	23	-35	-7.2		13	2	16	

NOME. Latitude 64° 30', longitude 165° 24'. Arthur Gibson, observer.

1911.								
January.....	29	-23	3.7	1.20	7	4	20	11
February.....	34	-28	6.7	1.54	10	3	15	14
March.....	30	-38	-3	.95	13	4	14	10
April.....	40	-10	17.4	.68	4	8	18	11
May.....	47	17	33.4	.66	6	2	23	8
June.....	78	30	47.1	.42	14	5	11	7
July.....	74	33	49.8	3.33	7	3	21	15
August.....	68	27	49.3	3.47	4	4	23	15
September.....	66	32	45.8	3.20	5	3	22	24
October.....	46	21	35.8	2.34	4	6	21	16
November.....	35	-8	19.3	.12	11	1	18	2
December.....	32	-22	1.2	.40	17	1	13	4

RAMPART HOUSE (Y. T.). Latitude 67° 25', longitude 141°. W. B. Reaburn, observer.

1911.								
June 1.....	85	35	60.0	1.53	17	3	1	4
July.....	83	39	60.5	2.08	18	6	7	5
August.....	76	29	51.8	1.49	16	4	11	7
September.....	77	9	43.0	.75	14	11	5	5
October.....	50	5	27.6	.40	9	8	14	3
November.....	28	-37	-7.0		14	5	11	
December.....	6	-40	-11.2		2	11	18	

¹ First 9 days are not given.

Condensed meteorological reports—Continued.

SKAGWAY. Latitude 59° 5', longitude 135°. H. D. Clark, observer.

Month.	Temperature.			Total precipitation. Inches.	Number of days—			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.	° F.	° F.	° F.	Inches.				
January.....	37	-8	10.0	0.07	9	14	8	3
February.....	44	-6	25.7	1.42	9	11	8	6

SUNRISE. Latitude 60° 54', longitude 149° 35'. A. Lawson, observer.

1911.								
January.....	36	-20	6.6	1.20	18	4	9	10
February.....	41	-12	17.8	6.01	6	5	17	18
March.....	40	-23	18.2	2.44	13	1	17	15
April.....	47	-4	28.3	4.74	8	9	13	13
May.....	53	24	38.4	1.34	8	9	14	18
June.....	76	28	49.4	.89	12	9	9	11
July.....	76	35	54.4	1.61	11	6	14	15
August.....	78	33	55.2	1.40	16	11	4	13
September.....	67	29	47.2	3.59	6	4	20	19
October.....	59	23	40.5	5.20	7	5	19	20
November.....	49	-6	22.7	3.64	11	3	16	13
December.....	39	-14	16.1	3.25	5	10	16	14

TANANA. Latitude 65° 13', longitude 152° 2'. Emma F. Warren, observer.

1911.								
January.....	4	-56	22.6	0.94	6	9	18	9
February.....	41	-51	4.4	1.63	3	4	21	14
March.....	32	-57	-4	.38	12	.....	19	11
April.....	50	-35	17.6	.77	9	5	16	5
May.....	59	21	43.1	1.53	4	9	18	15
June.....	84	28	56.2	.27	3	7	20	7
July.....	80	38	60.2	1.41	1	9	21	14
August.....	80	27	53.8	2.19	5	9	17	13
September.....	73	27	43.9	1.53	2	15	13	12
October.....	48	12	32.3	.44	4	12	15	5
November.....	34	-31	-1.6	.16	16	6	8	2
December.....	14	-52	-9.7	1.61	.....	8	23	15

VALDEZ. Latitude 61° 7', longitude 146° 20'. Emma May Blade, observer.

1911.								
January.....	36	1	20.1	2.81	7	8	16	9
February.....	47	.....	23.0	7.43	6	4	18	20
March.....	52	-6	24.1	5.98	12	9	10	15
April.....	61	11	33.6	4.52	15	5	10	12
May.....	64	24	43.5	2.72	7	4	20	20
June.....	78	30	50.8	2.46	13	4	13	13
July ¹	84	41	54.6	2.81	9	4	16	10
August ²	84	39	57.4	1.07	19	3	8	7
September ³	73	33	51.0	2.52	13	3	13	12
October.....	59	26	42.9	3.75	10	2	19	18
November.....	48	5	27.3	3.00	4	7	19	13
December ⁴	39	3	22.6	9.27	1	1	27	16

¹ No records on the 4th and 27th.² No record on the 15th.³ No record on the 17th.⁴ No records on the 21st and 23d.

Condensed meteorological reports—Continued.

JUNEAU. Latitude 58° 20', longitude 134° 30'. I. J. Sharick, observer.

Month.	Temperature.			Total precipi- tation. <i>Inches.</i>	Number of days—			
	Maxi- mum.	Mini- mum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1911.								
January.....	38	— 4	16.4	1.34	18	1	12	13
February.....	46	2	—	1.56	—	11	9	16
March.....	44	3	34.2	1.44	22	—	9	16
April.....	57	28	38.7	2.51	16	—	14	16
May.....	62	34	47.0	1.65	9	—	22	9
June.....	78	42	54.0	2.24	3	—	27	15
July.....	80	41	61.2	0.91	20	—	11	10
August.....	75	43	60.5	2.20	22	—	9	11
September.....	68	37	52.3	2.15	10	—	20	11
October.....	56	28	45.2	7.66	11	—	20	17
November.....	45	16	31.0	4.09	11	—	19	18
December.....	49	12	32.4	7.99	10	—	21	21



